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ABSTRACT

The final report of the Beersheva collaborative project in health manpower development is presented. The Center for Educational Development in Health (CEDH) (now located at Boston University Medical Center) worked with Ben Gurion University of the Negev to: field test the CEDH model for systematic curriculum design; design, implement, and evaluate a faculty teaching laboratory; and establish and maintain a collaborative relationship. The project was the first opportunity to test the model in a setting that emphasizes the training of primary care physicians and embraces both an underserved region in general and certain disadvantaged groups in particular. Creation of a curriculum development unit and a process for curriculum development is discussed, and the Beersheva Curriculum is described. The faculty teaching laboratory project involved teacher workshops, inservice training, development of units of instruction, use of learning packages in educational methods, and a learning resources center. The system for evaluating student performance and communication of results of the total project to medical educators in the United States are covered. Sample evaluation instruments, instructional materials, and other program materials are appended. An executive summary is included. (SB)

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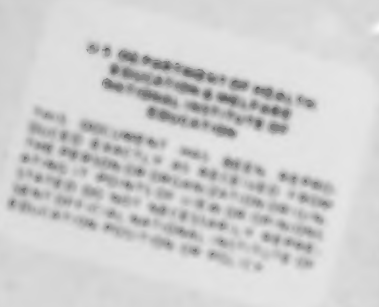
Harvard - Beersheva Collaborative Project in Health Manpower Development

Contract #HSI-PB-44163

Final Report



Submitted to

Bureau of Health Manpower

Health Resources Administration

Public Health Service

By the

Center for Educational Development in Health

Principal Investigator - Ascher J. Segall, M.D.

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September, 1977

VT

Harvard - Ben-Gurion University of the Negev
Collaborative Project in Health Manpower Development

Contract #HRI-PE-44163
7.1.1974 - 6.30.1977

Executive Summary

Submitted to:

Bureau of Health Manpower
Health Resources Administration
U.S. Public Health Service

By the:

Center for Educational Development in Health
Health Policy Institute
Boston University

September, 1977

Aacher J. Segall, M.D.: Principal Investigator

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Introductory Summary

Background

On June 30, 1977 Contract No. NO1-PE-44163 between the Bureau of Health Manpower and the Center for Educational Development in Health, formerly at the Harvard School of Public Health and now located at Boston University Medical Center was completed. The purpose of the contract was to provide support for a collaborative project in health manpower development involving the Center and the Faculty of Health Sciences, Ben Gurion University of the Negev.

The project was initially designed to field test the CEDH curriculum development model in a setting which emphasized the training of primary care physicians for service roles in an underserved area. The frontier mentality which characterized both the new Medical School and many aspects of life in Beersheva offers a unique opportunity to test an innovative curriculum, free of the constraints of tradition found in many other Medical Schools.

The problems associated with such a curriculum are similar to those which face medical educators in this country. However, circumstances under which the experiment in Beersheva is being conducted afford an opportunity not easily duplicated in the United States to develop innovative approaches to the solution of these problems. It is an underlying premise of the Project that certain of the solutions generated in Beersheva will be adaptable to American Medical Schools.

The scope of the project has encompassed three objectives.

1) To field test the Center for Educational Development in Health model for systematic curriculum design.

2) To design, conduct and evaluate a Faculty Teaching Laboratory.

3) To establish and maintain a collaborative relationship.

Progress in achieving these three objectives has been described in some detail in the final report and in successive annual reports submitted under the terms of this contract. The initial expectations as described above have been met. *The Center for Educational Development in Health model has been followed from the initial stages of the curriculum development process* at the Ben Gurion University of the Negev Medical School. This has been the first opportunity to test the model in a setting which emphasizes the training of primary care physicians and embraces both an underserved region in general and certain disadvantaged groups in particular. The procedures which comprise the model were applied in the planning and implementation phases of all subject areas. The modifications, adaptations and revisions which emerged from this experience have been incorporated into the various instructional activities of the Center.

A Faculty Teaching Laboratory was established to provide opportunities for faculty development. Teacher training has been offered both in formal

courses and through in-service consultation and courses. *Experience gained in Beersheva has had a significant impact on the teaching activities of the Center for Educational Development in Health.* Programs for faculty development in health professions schools in the United States in which the Center participates have been modified on the basis of the experience gained in Beersheva.

A *close collaborative relationship* has been established between the Center and the Medical School in Beersheva. Exchange of staff and students has taken place resulting in the enrichment of programs in both institutions. In addition, the Beersheva experiment in medical education has attracted interest among numerous medical educators and health professions schools in the United States.

The Beersheva experiment has reached the half-way mark. Three years from now the full six year program will have been developed and implemented. In 1974, a Medical School in Beersheva which would have as its special mission the training of primary care physicians was more a dream than reality. Today, approximately 150 students are being trained in a unique environment - one in which medical education is structured within the context of an entire health delivery system.

During the course of this contract, the educational program at the Medical School in Beersheva has acquired both direction and momentum. Consistently, the direction has been responsive to the goal of training a new type of physician. This is reflected in all aspects of the curriculum. The momentum, in turn, has in large measure been a result of the direction which the School has taken. The high level of commitment among faculty and students would have been unlikely in the absence of a challenge such as that posed by the innovative approach to medical education. The question at this point is whether the approach can be sustained as the novelty recedes.

Several considerations suggest that this may be the case, at least over the short term. The curriculum for the first two phases has proven to be fairly stable. It appears to have met the expectations of both teachers and students. Changes which have been recommended have been relatively minor and relate more to improving the quality of instruction than to altering the basic approach. Consonance between the system of evaluation and the process of instruction and the clear relationship of both to the educational goals of the Medical School have probably been important factors in achieving this stability.

Implications for medical education in the United States

Many of the issues which are faced in training highly qualified physicians who will practice primary care in a disadvantaged region in Israel are similar to those encountered by American medical educators. As the outcomes at Beersheva are evaluated over the next three years, solutions which were initially specific to Israel may prove to have broad application to the training of health manpower in the United States.

In the area of *curriculum organization* and *sequencing* certain innovations may have domestic applications:

Curriculum organization along a spiral model rather than by layers with sciences, clinical studies and community medicine starting in the first year and continuing throughout the six year program.

Stress on integration and coordination throughout the curriculum in the teaching of the basic sciences, the clinical program and community medicine.

Emphasis on the development of competencies in self-directed learning, problem-solving and interdisciplinary thinking, which form the basis for an integrative final examination at the end of each year.

Provision of clinical experience for students from the first year of studies in many different settings which relate one to the other so that the students experience the problems of providing for continuity of medical care throughout the natural history of disease.

Adaptation of the integrated organ system approach and its articulation with a competency-based clerkship program in such a way as to facilitate learning and encourage patterns of self-education.

The *evaluation system* being developed in Beersheva represents a more coherent and rational system than is currently in operation in many medical schools. While more data are necessary, the outcome of this vital area in curriculum design may well be adaptable to the needs of medical schools in the United States.

The approach to *student selection* in Beersheva with its attempt to identify students who have a high probability of opting for careers in primary care may have implications for medical schools in the United States. Intellectual capabilities are evaluated on a threshold basis, and a high weight is assigned to character assessment by representatives from both the medical profession and the community at large. This approach requires further validation in terms of student academic performance and ultimate career choice. In the interim, however, medical schools in the United States may wish to consider utilizing some of the admission procedures developed in Beersheva.

Provision of opportunities for *clinical studies* in a wide range of health care facilities rather than exclusively within the confines of the hospital is a hallmark of the program of studies in Beersheva. These include carefully structured learning experiences in urban and rural ambulatory care centers, inpatient and outpatient hospital departments and community-based facilities for early detection of disease, mental health services, pediatric and geriatric care, occupational health and rehabilitation. Ways in which these experiences can be integrated to provide a more balanced approach to prevention, therapy and rehabilitation are being developed. Use of the natural history of disease model as a theme common to teaching in all clinical settings is proving quite effective in this regard. This approach has also helped bridge the traditional gap between clinical instruction and the teaching of public health. A number of medical schools in the United States have already indicated considerable interest in adapting this aspect of the Beersheva curriculum to their own needs.

Of perhaps a less tangible nature than the "outcomes" described thus far is the *process* of curriculum development which has evolved in Beersheva. The need to secure the active co-operation of basic scientists and clinicians who were unfamiliar with the basic approach has resulted in the elaboration of patterns of governance designed to facilitate the adoption of innovative educational methods without alienating the more conservative members of the faculty. The lessons learned in Beersheva have implications for American medical schools in which efforts are being made to introduce significant changes oriented towards primary care training in the curriculum.

Of particular significance in terms of domestic application are *three distinctive instructional resources* to which the nature of the curriculum in Beersheva has given rise; a compilation of units of instruction covering virtually all segments of the curriculum, a learning resources center which provides a responsive environment for student initiated learning activities and the first of a network of primary care teaching clinics.

The role of the *primary care teaching clinics* is to provide community-based academic counterparts to the clinical facilities of the teaching hospitals. They will serve as sites for experimenting with new patterns for delivering health care and provide settings with appropriate role models for undergraduate and graduate education. Each clinic will have considerable autonomy in determining the manner in which health services are delivered and in matters related to internal organization and relationships with other components of the health care system. Procedures are being designed to evaluate both the process of providing services and the outcomes in terms of the health status of the population served. There is one important constraint. The ordinary operating budget for a teaching clinic will be similar to that of a regular clinic serving an equivalent population base. It is anticipated that this will increase the probability that measures introduced in the teaching clinics and found to be successful can be replicated throughout the Negev region.

Hospital-based physicians will provide consultative services to the clinics and the primary care practitioners will assume appropriate responsibilities for the care of their patients who are hospitalized. This linkage between hospital and community will provide a mechanism by which the primary care dimensions of medical practice can be taught effectively. During the hospital-based portion of the clerkships students will participate in consultative services provided to the clinics. They will also have opportunities to follow patients who, after discharge from the hospital, return to the clinics for continuing care. As part of the primary care clerkship students will take part in the service and research activities of the teaching clinics. This includes following clinic patients during periods of hospitalization.

It is postulated that continued development of the elements discussed above which are characteristic of the curriculum in Beersheva will yield results which can find effective application in American medical education.

Dissemination of results among American medical educators

If the potential applications of the Beersheva experience are to be realized they must be communicated to medical educators in this country. *This communication has taken several forms.* The first is through visiting faculty

and students from the United States. In year 01, there were twelve visiting faculty from the United States; in year 02, twenty-nine faculty and in year 03 33 faculty from American medical schools visited the Ben Gurion Health Sciences Center, and participated in various projects.

A second way of disseminating information generated at Beersheva has been through the activities of the Center for Educational Development in Health. Experience gained at Beersheva is being incorporated into the teaching materials of the Center. Examples of the Center's activities in which these materials have been used include the ongoing teacher training program in which faculty from medical schools across the country participate; a collaborative project with the Association of Teachers of Preventive Medicine to develop curriculum in preventive medicine for American medical schools (1975-); and a regional Conference on Health Manpower Development for Underserved Areas of New England (1976).

A third method of dissemination will be through an Academic Liaison Committee currently being organized. It is anticipated that the American Liaison Committee will include faculty from medical schools in all regions of the United States, and will cover a broad range of disciplines.

Background

The Harvard-Ben Gurion University of the Negev Collaborative Project in Health Manpower Development was designed to field test a model for curriculum development elaborated by the Center for Educational Development in Health (CEDH) in a setting which emphasizes the training of primary care physicians for practice in an underserved area.

Center for Educational Development in Health

The Center for Educational Development in Health, formerly at the Harvard School of Public Health and currently part of Boston University Health Policy Institute, is concerned with the development of curricula and the training of teachers for the health professions. During the past ten years the Center has trained over 600 health professionals in educational methodology and has participated in numerous collaborative projects for the development of curricula in the fields of preventive medicine and primary health care.

Currently, the model and associated instructional materials are being field tested to determine their applicability under diverse conditions so as to enable the Center to revise and modify the approach as a means of increasing its range of applicability. Field sites include medical schools in the United States as well as programs for health manpower training in developing areas of the world.

Faculty of Health Sciences, Ben Gurion University of the Negev

In 1973, the Government of Israel authorized the establishment of a Faculty of Health Sciences at the Ben Gurion University of the Negev in Beersheva. A School of Medicine, the first component of the Faculty, was opened in 1974. The Medical School is part of a consortium of health agencies which serve the Negev Region for which the following objectives have been delineated:

1) to develop and implement an integrated program for delivery of preventive, curative and rehabilitative care to the total population of the Negev.

2) to merge this integrated health care system with the Faculty of Health Sciences under a single authority.

3) to educate in this new framework a different type of physician whose primary role will be to provide service in an integrated hospital-community health care system.

Professor Moshe Prywes, Dean of the Medical School, whose vision led to the establishment of the consortium, serves as its director and is thus responsible for all health care in the area. The merging of medical education with the delivery of health services under a single authority has several dimensions. Firstly, it implies a potential impact of the Medical School on the quality of health care through direct involvement in modifying the system for delivery of health services in the Negev. Rarely has a medical school participated in

the planning and implementation of all levels of health care for an entire region. This is the intent in Beersheva which, in the context of the Negev, implies involving in the educational process not only a major teaching hospital but all sectors of the health care system including the peripheral ambulatory services in the rural and developing areas.

A second dimension relates to the possibility of examining the role of the physician in different health care settings in terms of the competencies required for professional performance. Educational objectives for the Medical School derived from the real world of medical practice can then be formulated. Of perhaps greater significance is the potential to bring about changes in the role of the physician within the system. By anchoring the educational program in all facets of the health care delivery system, it will both stimulate and reflect changes in the patterns of health services.

It is the opportunity for decisive involvement in determining the roles and responsibilities for which the school is to prepare students which characterizes the interface between medical education and medical care in Beersheva. If successful, it may give rise to a new consonance between the process of medical education and the full range of health needs of the community.

Circumstances under which the experiment in medical education in Beersheva is being conducted afford an opportunity not easily duplicated in the United States to develop innovative approaches to the training of primary care physicians for service in an economically disadvantaged area. In addition, the faculty of the Medical School was prepared to adopt the CEDH model in the process of curriculum development for its entire educational program and as a basis for its teacher training program.

Rationale for a Collaborative Project

The problems associated with the development and implementation of an innovative curriculum in Beersheva are likely to be similar to those which face American medical educators. It is therefore postulated that what is found to be feasible and effective under the difficult conditions of the Negev may well be adaptable to the education of physicians in the United States.

In the light of these considerations, it was felt that a collaborative project involving the Center for Educational Development in Health and the Faculty of Health Sciences at the Ben Gurion University of the Negev would have potential benefits both for Beersheva and for medical education in this country.

Objectives

The objectives of the CEDH-Ben Gurion Collaborative Project in Health Manpower Development under the terms of Contract No. NO1-FR-44163 are:

1) To field test the CEDH model for systematic curriculum development.

The following major components are included:

Development of a mastery description.

Development of educational goals and competency-based objectives.

Design of the curriculum.

Development of an evaluation plan.

2) To design, conduct and evaluate a Faculty Teaching Laboratory.

The steps to be followed include:

Identify the teaching competencies needed by faculty at the Medical School.

Determine the most effective means, given the resources and constraints in Beersheva, by which members of the faculty could acquire these competencies.

Provide opportunities for faculty to acquire the competencies identified.

Evaluate outcomes of the faculty development program.

3) To establish and maintain a collaborative relationship between the Center for Educational Development in Health and the Ben Gurion University of the Negev.

The collaborative relationship to be established includes:

Participation of CEDH staff in the development, implementation and evaluation of the curriculum for the School of Medicine in Beersheva. This will involve primarily introduction of the CEDH model as a basis for curriculum development and faculty training.

Dissemination through CEDH of the results of the Beersheva experience among medical educators in the United States.

METHODS

Methods to achieve the objectives specified under Contract NO1-PE-44163 include:

1) Curriculum Development Unit

The principal instrument for implementing the terms of this contract is the Curriculum Development Unit in Beersheva through which input from the Center for Educational Development in Health is channeled. The Unit, established in 1974, has as its *purpose* to provide staff support, mobilize instructional resources, assume responsibility for faculty development activities and oversee implementation of the evaluation system. It has fulfilled the following functions:

Recruitment and training of teachers.

Management of the curriculum development process.

Evaluation of student performance and the learning process.

The Unit is *staffed* by a small number of full time professionals whose efforts are supplemented by part-time operational consultants as well as a small number of resource consultants who provide consultation on a continuous or ad hoc basis but do not assume operational responsibilities.

The Unit consists of three sections; planning and evaluation, curriculum implementation, and learning resources.

2) Process for Curriculum Development

The curriculum development process in Beersheva consists of several stages.

An initial preparatory stage is concerned with recruiting faculty, communicating the basic philosophy of the Medical School and reaching consensus relative to broad educational goals. This is accomplished through a series of informal reference groups which formulate *guidelines* for developing the program of instruction.

The second stage is one of detailed curriculum planning. Subject area committees on the basis of the initial guidelines develop competency-based objectives, select teaching methods and develop evaluation plans. The proposals of the various subject area committees are then collated into a *comprehensive projection* for each phase of the curriculum.

In a third stage, these projections are reviewed and revised by co-ordinating councils consisting of all course co-ordinators for each of the several phases of the curriculum. The councils may require that instructional objectives be modified, redelineate subject area boundaries and allocate instructional resources. A *definitive curriculum* is then elaborated.

The fourth stage is one of *implementation* which is supervised by executive committees appointed by the co-ordinating councils for the respective phases of the curriculum.

A fifth stage occurs after the completion of each course and addresses the need for *curriculum modification* in the light of feedback from examinations and assessment of courses by students.

The curriculum development process is characterized by:

- a *wide basis* for decision making involving broad participation on the part of students and teachers.

- an approach which emphasizes the notion of curriculum development through *successive approximations*. Implementation of objectives is *phased* over a period of time appropriate to the resources and constraints.

3) Communication of Results to Medical Educators in the United States

Related to objective 3 of the present contract is the dissemination of results of the Beersheva experiment among American medical educators. This has taken several forms:

- *Personal visits* by faculty from medical schools in the United States has thus far been the most effective way of communicating the Beersheva experience. A total of *74 American faculty* members from *30 medical schools* across the United States have visited the Faculty of Health Sciences at the Ben Gurion University of the Negev. Over 70% spent more than two weeks in Beersheva.

- The experience gained in Beersheva is being incorporated in the *revision of the basic CEDM model* for systematic curriculum development. These modifications are reflected in all activities of the Center. These include the Center's ongoing teacher training program in which faculty from medical schools across the United States participate and a collaborative project with the Association of Teachers of Preventive Medicine to develop curriculum in preventive medicine for American medical schools.

- A third method of dissemination is through an *Academic Liaison Committee*. First steps to establish this committee were taken in the latter part of year 03 of the present contract.

HIGHLIGHTS

The activities described below were conducted at the Faculty of Health Sciences, Ben Gurion University of the Negev in Beersheva.

1974

July	Contract #NO1-PB-44163 begins.
	Curriculum Development Unit at the School of Medicine is established.
August	First class of 32 students is admitted to the School of Medicine.
September	Planning of first year curriculum is completed.
October	First year program of studies is initiated; based on integration of basic science, clinical and public health components.
November	First teacher training workshop is held under the auspices of the Faculty Teaching Laboratory.
December	Learning Resources Center opens.

1975

January	CEDH model is formally adopted at the first general faculty meeting as the basis for all curriculum development.
June	End of contract year 01 during which 12 medical educators from the U.S.A. visited Beersheva to observe the development of the School of Medicine.
August	First integrative final examination is administered at the end of the first year of studies.
	Second class of 35 students is admitted.
September	Planning of second year curriculum is completed.
October	Second year program of studies is initiated; based on introductory courses in the basic medical sciences co-ordinated with clinical studies.

1976

June	End of contract year 02 during which 29 observers from American medical schools visited Beersheva.
August	The first integrative examination is administered at the end of the second year of the program of studies.
	Third class of (35) students is admitted.
September	Planning of third year curriculum is completed.
October	Third year program of studies is initiated; based on integrated organ system modules.

1977

February	First community ambulatory teaching clinic is opened.
May	A remedial intervention system based on the use of students as tutors is initiated.
June	Contract #NO1-PE-44163 ends.

RESULTS 1. THE CURRICULUM

The curriculum of the Medical School represents one of the principal outcomes achieved as a result of the collaboration between the Center for Educational Development in Health and the Faculty of Health Sciences at the Ben Gurion University of the Negev.

The curriculum is designed to be responsive to *three major issues* which confront medical education throughout the world today.

1) The changing role of the physician

- The emphasis in Beersheva is on preparing physicians who can function effectively as either *generalists* or *specialists* in an *integrated hospital-community* system of health care.
- The distinguishing characteristic of this role is the responsibility it entails for participating in the delivery of *primary care* services. This is viewed as an essential component in the redefinition of the physicians' role to which the Medical School is committed.
- The frame of reference for integrating knowledge, skills and attitudes related to primary care which informs all aspects of the curriculum is based on the *natural history of disease* concept.

2) The information explosion in medicine

- The curriculum is designed in terms of *competency-based learning objectives* which are derived from analysis of *physician performance*. This approach tends to diminish the arbitrary element in curricular decision-making by relating medical studies at the undergraduate level to clearly defined expectations of future performance in the professional setting.
- Beyond the consideration of curriculum content, there is a need to address the nature of the *learning process* itself as a means for preparing students to adapt to the constantly changing technological and social basis of the medical process. This has resulted in an emphasis on:

    a) acquisition of *independent learning styles* and skills in *self assessment* by the student.

    b) development of *problem-solving skills* as applied to the basic sciences, clinical practice and the solution of community health problems.

3) Relevance in Medical Education

- The *spiral* concept of curriculum adopted in Beersheva is based on the premise that learning and retention occur more effectively when *reinforced* concurrently across diverse components of the curriculum and longitudinally over successive phases of the program of studies.

- Three principal curricular components are delineated: *basic sciences, personal health care* and *public health*. Instruction in each component begins in the *first year* and continues at successive levels of sophistication through the end of studies. From the outset, appropriate experience in clinical and public health settings is interwoven with acquisition of a knowledge base in the natural and medical sciences.

- Teaching is *integrated* both *horizontally*, among subject areas within a particular phase of the curriculum and *vertically* among subject areas over successive phases.

- The spiral concept of curriculum provides for learning through *successive approximations* over the entire six year program. Just as clinical studies commence in the first year and continue until graduation, so the basic sciences are not confined to the early portion of the curriculum. Both proceed in tandem, drawing from whatever fields of knowledge can contribute to solving the particular problem under consideration.

The curriculum projection is based on these considerations and encompasses *six and a half years of study* divided into five phases. Under the present contract the first three years were implemented.

Phase I - coincides with the first year of studies. Students acquire a foundation in the physical, natural and social sciences. Concurrently, they begin clinical studies and learn basic skills in public health.

Phase II - comprises the second year of studies in which the basic medical sciences are introduced and further clinical and public health competencies are acquired.

Phase III - extends from the third through the fifth year of study. It consists of integrated organ system modules which alternate with clinical clerkships.

Phase IV - is a one year rotating internship required under the Israeli system of medical education.

Phase V - offers students an opportunity to return to an academic setting for variable periods of time to engage in further elective work and study following completion of the internship.

Elements of the curriculum which are particularly characteristic of the Beersheva approach and that may be adaptable to medical education in the United States include:

- Early Clinical Program: During the first two years students are involved in clinical studies one full day each week and one full month at the end of the academic year. They acquire basic skills in *communication, observation* and *medical intervention* as a basis for subsequent study of history-taking, physical examination and patient care. These skills are taught in formal courses and applied in *six clinical tracks* which provide for learning experiences in health clinics, outpatient settings, hospitals, public health stations, chronic disease facilities and health-related institutions.

- Integrated Public Health Teaching: The teaching of public health is *integrated* with the basic sciences and clinical studies in *all* years of the curriculum. In the early years students acquire basic skills in the *identification* of community-health problems. In subsequent phases of the curriculum they are afforded opportunities to develop methods for *intervention* at a community level and to acquire experience by participating in public health programs.

- A Systems Approach to the Basic Sciences: The teaching of the basic sciences in the first year biology program and in the third through the fifth years is organized according to organ systems. In biology the focus is on *comparative study* of organ systems as a basis for the *organ system modules* in subsequent phases of the curriculum in which the teaching of appropriate disciplines is integrated within the framework of eleven organ systems. The second year is devoted primarily to introductory *disciplinary courses* in the basic medical sciences through which students acquire the vocabulary, concepts and methods of the individual disciplines in preparation for the later *interdisciplinary* organ system modules.

- Competency-based Clerkships: The clerkships are designed to facilitate the acquisition of a *specific set of competencies*. These competencies take into account student learning during the early clinical program and emphasize physician responsibilities throughout the successive phases of the *natural history of disease*. For this reason, *all* clerkships encompass learning experiences in medical care settings outside the walls of the hospital as well as instructional activities in the hospital wards.

- Emphasis on Primary Care: From the first year of the educational program the curriculum content, methods of teaching and settings selected for instruction reflect an emphasis on the *primary care dimension* of medical practice.

FIGURE 4 - PHASE I

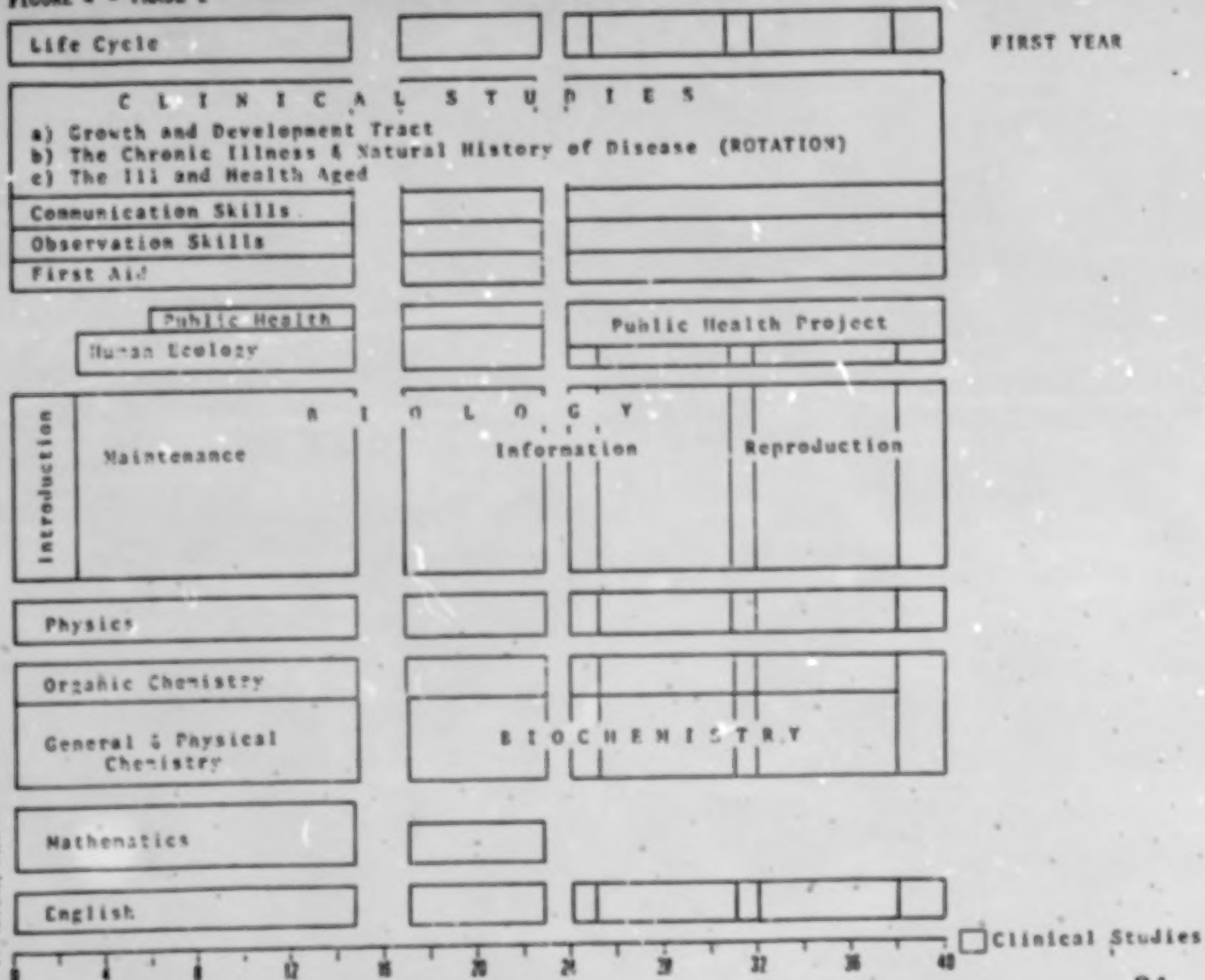
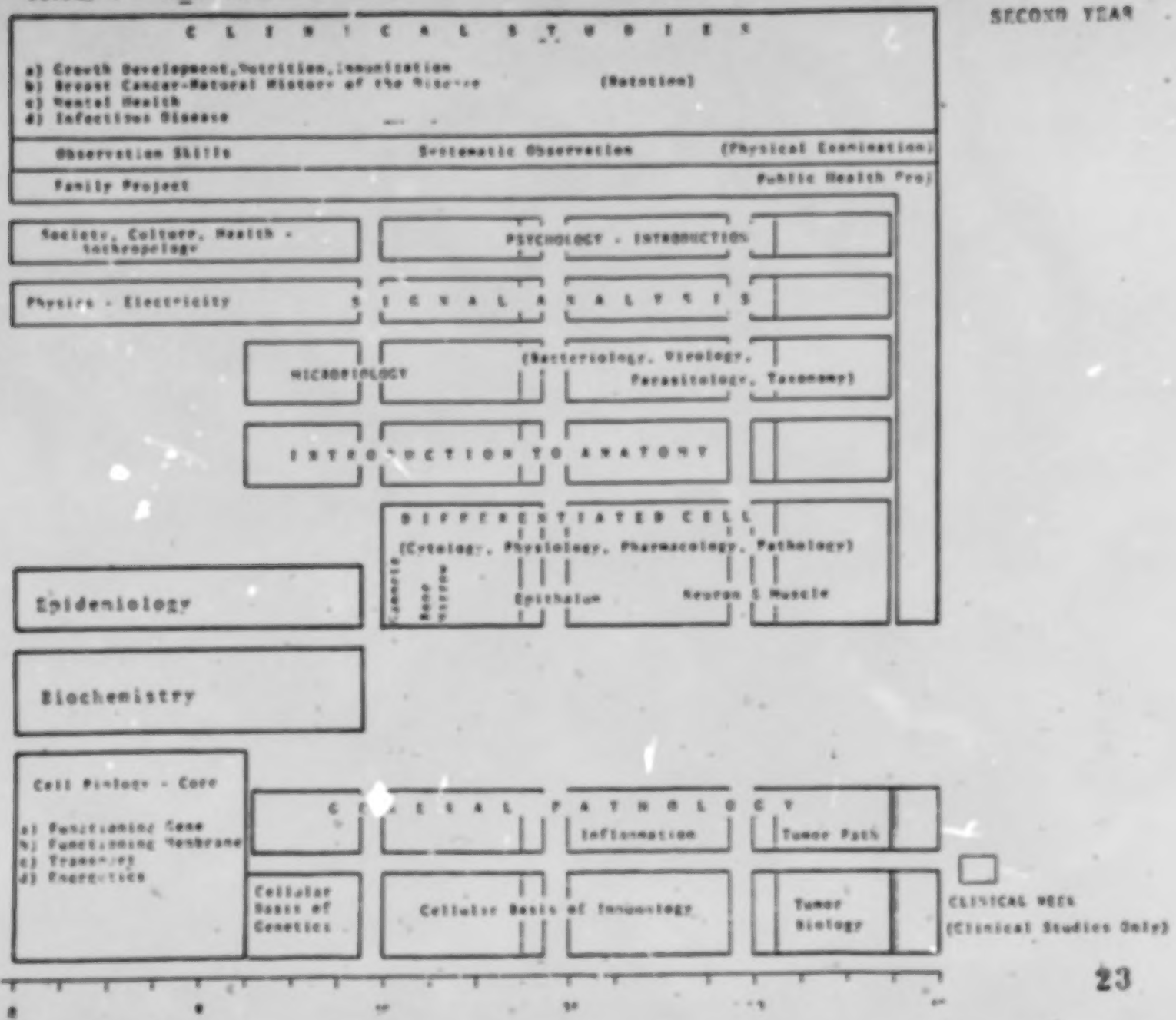


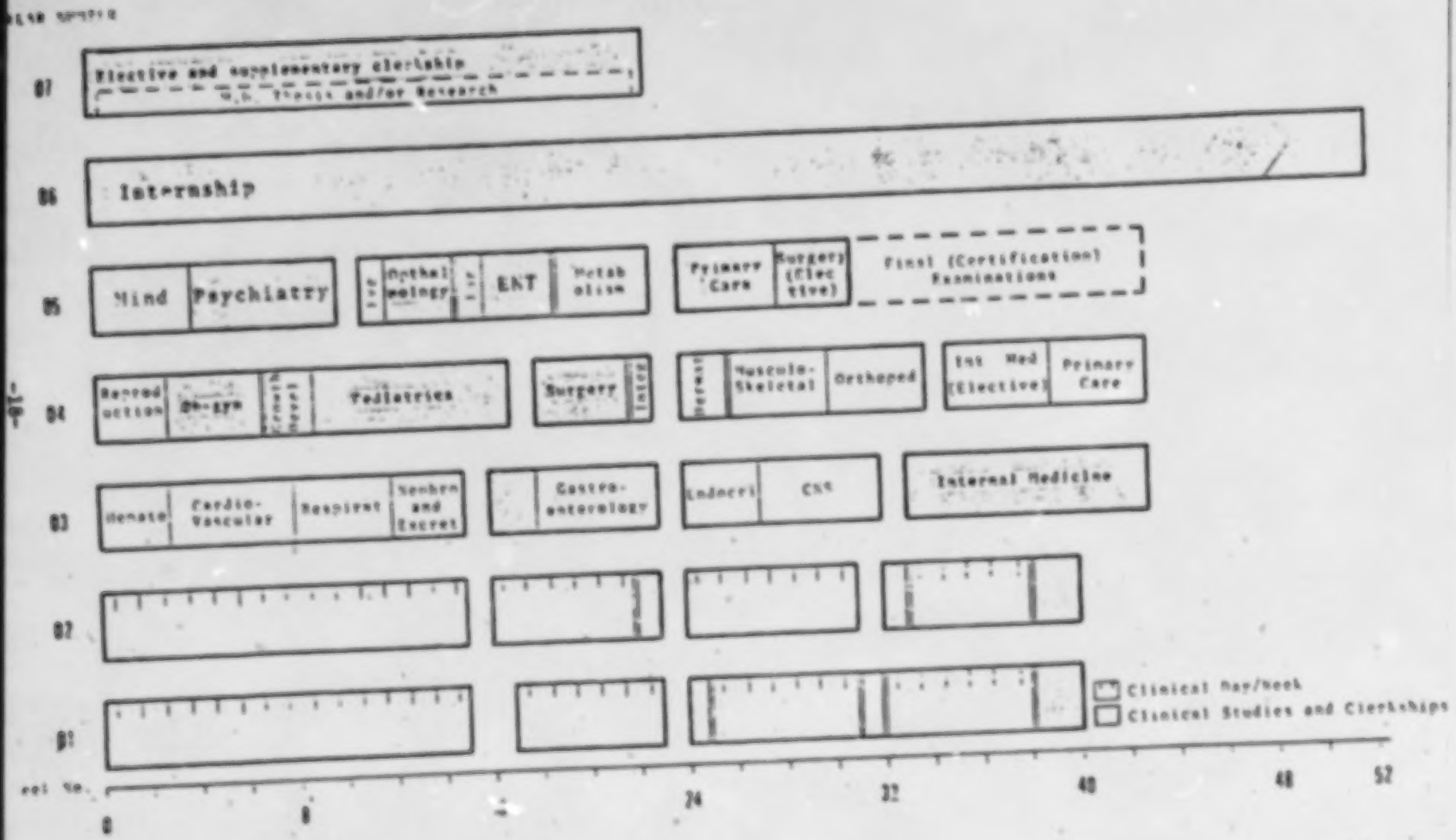
FIGURE 5 - PHASE II

SECOND YEAR


C L I N I C A L S T U D I E S
a) Growth Development, Nutrition, Immunization
b) Breast Cancer-Natural History of the Disease (Rotation)
c) Mental Health
d) Infectious Disease
Observation Skills
Systematic Observation
(Physical Examination)
Family Project
Public Health Proj
Society, Culture, Health - Anthropology
PSYCHOLOGY - INTRODUCTION
Physics - Electricity
S I G N A L A N A L Y S I S
MICROBIOLOGY
(Bacteriology, Virology, Parasitology, Taxonomy)
I N T R O D U C T I O N T O A N A T O M Y
D I F F E R E N T I A T E D C E L L
(Cytology, Physiology, Pharmacology, Pathology)
Epithelium
Neuron & Muscle
Epidemiology
Biochemistry
Cell Biology - Core
a) Functional Core
b) Functioning Membrane
c) Transport
d) Reproduction
C E L L U L A R P A T H O L O G Y
Inflammation
Tumor Path
Cellular Basis of Genetics
Cellular Basis of Immunology
Tumor Biology
CLINICAL WEEK
(Clinical Studies Only)
HOURS/WEEK
WEEK

-11-

FIGURE 6 - PHASES III-V



Results 2. The Evaluation System

The evaluation of student performance and the teaching process are of particular importance in a new Medical School which is innovative in both the content of the curriculum and the methods of instruction. While the long term impact of the undergraduate experience is of primary interest, during the period of the present contract there was no alternative but to focus attention on the evolution of knowledge, skills and attitudes during the course of the first three years of the educational program.

Principles for Evaluation of Student Competencies

- Evaluation will be *competency based.*
- The competencies to be evaluated will be *weighted* according to explicit criteria.
- Evaluation of essential competencies will be *criterion referenced* while elective competencies may be norm referenced.
- Evaluation will be predominantly at the *problem-solving* cognitive level.
- The ability to *integrate* information from different disciplines will be a major focus of evaluation.
- Testing will be at the *highest level of simulation* which is feasible.
- Evaluation instruments will be developed *prior* to the onset of instruction.
- Only summative evaluation will be used for purposes of *certification.*
- The results of evaluation will be used for *decision-making* concerning the curriculum.
- The optimal evaluation system will be approached through *successive approximations.*
- *Attitudes* will be evaluated to the extent that this is possible.

Components of the System

The components for evaluating student performance were adapted from the model developed by the Center for Educational Development in Health to the needs of Beersheva as specified in the principles described above.

The axis of the system is represented by the *units of instruction* with their associated sets of guidance questions. These questions constitute a *pool* from which test items are adapted for use in the progress and post-tests and the integrative certifying examinations.

Prior to each course a *pre-test* is given emphasizing entry level

competencies. This is generally administered by the instructor and the results are used for identifying the need for remedial intervention in the case of individual students and to alert the instructor to the need for possible modifications of the course as planned.

Progress tests are given throughout the course. They are generally self-administered and self-evaluated by the student who is then responsible for initiating remedial measures if required.

At the end of each course a *post-test* is given. This is instructor administered and evaluated. Results are used for remedial intervention and planning course modifications. They are not used for purposes of certification.

Certification examinations are given at the end of each year in the first two years. These examinations are *integrative* and test problem-solving skills utilizing knowledge from the various disciplines studied. There are no certifying examinations by individual discipline.

There are no certifying examinations for the integrated organ system modules during the third through the fifth years. Students are expected to successfully take the post-test following each module prior to beginning the related clerkship. Portions of the post-tests may be *repeated* until competency is demonstrated.

Evaluation of the clinical clerkships is *competency-based*. It encompasses an element of *continuous* monitoring of student performance as well as testing at the end of the clerkship.

A *final* qualifying examination is projected. At the time this report was prepared the characteristics of this final examination prior to graduation had not as yet been delineated.

Results 3. Faculty Teaching Laboratory

The development of faculty teaching competencies represents a major objective of the current contract. To this end, a Faculty Teaching Laboratory was established by the Curriculum Development Unit with guidance from staff of the Center for Educational Development in Health. The first step involved recruitment of faculty. This was followed by establishment of the Faculty Teaching Laboratory.

The Faculty Teaching Laboratory encompassed a number of faculty development activities designed to prepare members of the faculty to participate in the development, implementation and evaluation of an innovative curriculum.

1) Activities of the Faculty Teaching Laboratory

Teacher Training Workshops. A total of 12 workshops in *basic educational methods*, based on the CEDH model for systematic course design, was offered from July, 1974 through June, 1977. Approximately 145 members of the faculty participated in the workshops. A series of 14 *second level workshops* in a) developing units of instruction, b) teaching communication skills, c) developing evaluation instruments and d) teaching clinical skills was organized with the participation of 45 teachers.

Inservice Training. Due to external constraints many teachers were *unable to participate in the formal workshops*. To overcome this difficulty, inservice training to individual teachers and subject area committees was provided during the process of course preparation. This teacher training activity was initiated in 1974, continued through 1977 and involved the preparation of approximately 84 courses.

Development of Units of Instruction. The development of Units of Instruction was one of the most important activities of the Faculty Teaching Laboratory. Units of instruction were prepared for 85% of the courses. They serve to clearly *define the content*, boundaries and depth of teaching in each subject area and to *specify the competencies* expected of students at successive stages of the curriculum. The units of instruction are used to *integrate* different components of the program of studies, to *provide guidance* for student independent learning, to provide *criteria for selection of appropriate teaching methods* and to constitute the basic unit of a criterion-based *evaluation* system.

Learning Packages in Educational Methods. To supplement the formal workshops and inservice consultation learning packages in educational methods are being developed. These are *self instructional materials* on various teaching methods used in Beersheva. They are designed to foster self-learning by members of the faculty and thus help to overcome the constraints on participation in group paced workshops. The themes of the packages are similar to those of the basic workshop.

Learning Resources Center. The Learning Resources Center provides a responsive environment wherein students and teachers have an opportunity to explore approaches to learning beyond those of the formally scheduled classes. This facility was also used by teachers to experiment with innovative methods of teaching.

2) Impact of the Faculty Teaching Laboratory

It constituted tangible evidence of the commitment of the medical school to the approach towards teaching which had been "proclaimed" at the time of its founding.

It helped create a community of teachers who identified with each other and with the goals of the school.

It helped the individual teacher to develop an image which reflected, in addition to his own primary professional role such as clinician, researcher or administrator, that of an *educator* - with the sources of satisfaction and sense of responsibility which this implies.

It gave teachers the *tools* to do what was expected of them, thus enabling them to translate good intentions into concrete actions.

It provided a mechanism for *feedback* to the Curriculum Unit which enabled the unit to identify new training needs as they arose and to be responsible to the perceived needs of the teachers.

3) Methods of Evaluating the Faculty Teaching Laboratory

Feedback from Faculty. Following each activity of the Faculty Teaching Laboratory feedback was obtained from participating faculty members concerning the strengths and weaknesses of the activity and recommendations for improvement.

Debriefing Sessions. During debriefing sessions held when each course is completed student evaluation of the instructional process is obtained which together with results of evaluation of student performance in the subject area provide information concerning the effectiveness of the teacher training activities.

Student Questionnaires. Each student completes a questionnaire at the end of every course. The data thus obtained provide an additional source of information concerning teacher effectiveness.

RESULTS 4. SPECIAL ASPECTS

During the course of the present contract several aspects of the Beersheva program emerged which may be of special significance in terms of implications for medical education in the United States.

1. The Admissions Process

Designed to select candidates on the basis of adequate performance in previous studies and according to a set of specified intellectual and personality characteristics. While previous *academic achievement* is not ignored, this approach places considerable emphasis on the consonance between the expectations and *goals of the applicant* and the *objectives of the Medical School*.

There are *four stages* to the selection process. The first two stages consist of meeting entrance requirements and taking an entrance examination. These are based on *threshold* or cutoff points. A candidate far above the threshold has no advantage over one who has just reached the threshold; both move to the next stage.

In the third stage each candidate is interviewed by *two teams of interviewers*. Each team consists of a physician and a member of the community in the Negev. The interviewers undergo a period of training prior to conducting the interviews. At this stage the focus is on value and personality characteristics of the candidate, the experiences which shaped them and of greater importance, through which they had been expressed. Interviewers do not have access to results of the first two stages.

In the fourth and final stage, candidates who have not as yet been eliminated are interviewed by a *third team*. The results of all three previous stages are considered together and the final decision is made.

The admissions process in Beersheva results in classes which are quite *heterogeneous* with respect to previous academic background and performance as well as social and cultural background. This has had major implications for the type of curriculum needed.

2. Community ambulatory teaching clinics

The establishment of ambulatory teaching clinics relates to the two goals which distinguish the Medical School in Beersheva from others in Israel. The first is to utilize the academic establishment as a means to develop and implement *changes in the health care system* of the Negev region. The second is to *attract medical students* to the field of primary care. The first clinic was established in the Spring of 1977.

The role of these clinics is to provide *community-based counterparts* to the clinical facilities of the teaching hospitals. They will serve as sites for experimenting with new patterns for delivering primary health care and provide settings with appropriate *role models* for undergraduate and graduate education.

Hospital-based physicians will provide consultative services to the clinics and the primary care practitioners will assume appropriate responsibilities for the care of their patients who are hospitalized.

During the hospital-based portion of the clerkships students will follow patients, who, after discharge, return to the clinics for continuing care. As part of the primary care clerkships they will follow patients during periods of hospitalization.

3. Learning Resources Center

The Center seeks to provide a *responsive environment* which would enable students to acquire learning experiences which are not part of the formal program of instruction. These include review of areas covered in formal courses with opportunities for remedial intervention and exploration of new avenues of interest outside the scope of regular courses.

The Center also provides opportunities for teachers to *experiment* with innovative methods of teaching with students participating on an elective basis.

Equipment and instructional software are concentrated in space designated for this purpose. Additional facilities may be mobilized on an ad hoc basis in other parts of the medical school, university, hospital and clinics.

Members of the regular faculty and appropriate guests advise individual students, provide guidance for groups working on projects and participate in special presentations, demonstrations and seminars.

4. Systems for Remedial Intervention

In the light of the heterogeneity of the student body with respect to academic background and the intensive nature of the curriculum, there is a need for careful monitoring of student progress and providing opportunities for remedial intervention.

Providing remedial intervention has proven a difficult task due to the shortage of teachers. In 1977, a new initiative was taken. With four classes of the Medical School comprising some 150 persons, it was possible to *identify potential tutors in a number of subject areas from among the students themselves*. The use of student tutors is consistent with the School's stress on co-operation rather than competition and promises to assure the viability of a system for remedial intervention.

RECOMMENDATIONS

In the light of the successful conclusion of Contract No. NO1-PE-44163 and the increasing potential for experience gained in the Beersheva experiment to have an impact on medical education in the United States, it is recommended that the collaboration between the Center for Educational Development in Health and the Faculty of Health Sciences at the Ben Gurion University of the Negev be continued. The purpose of such collaboration would encompass the following objectives:

1) To *identify* components of the Beersheva medical curriculum which can be adapted to meet the needs of medical education in the United States.

2) To *develop* materials related to these components in formats which will facilitate their utilization in the United States.

3) To *disseminate* the results of the Beersheva experience, in part through these materials, among American medical educators.

These objectives build on the experience acquired under contract NO1-PE-44163. They differ, however, in orientation. They relate solely to steps which can *facilitate communication* of the results from the Beersheva experiment to American medical educators.

Outputs under this continuing collaboration will be of two types. The first consists of materials which are designed *specifically* for use in medical schools in the United States. The second provides a delivery system whereby maximum *dissemination* of these materials can be achieved.

1. To identify components of the Beersheva medical curriculum which can be adapted to meet the needs of medical education in the United States.

   The following aspects of the program would be reviewed in association with a panel of American medical educators to determine which components are of particular relevance to medical education in the United States.

   a) <u>The curriculum development process</u>: general approach, specific procedures, organization, governance, institutionalization of opportunities for change, mechanisms for ensuring incorporation of the primary care dimension of medical practice, developing competency-based objectives based on analysis of physician performance and the successive approximation approach to curriculum development.

   b) <u>Specific aspects of the curriculum</u>: components related to primary care in basic science and clinical subject areas, use of the natural history of disease concept as an integrative theme, program for early introduction of competency-based clinical teaching, longitudinal integration of instruction in community-medicine over the six year curriculum, ways of achieving horizontal and vertical inte-

gration in the teaching of basic sciences, clinical medicine and public health, integrating hospital-based teaching with learning experiences in a variety of health care facilities in the community and the primary care dimensions of clinical clerkships in all fields.

c) Instructional methods, facilities and materials: use of the primary care teaching clinic as an academic community-based counterpart to teaching facilities in hospitals, the function of a learning resources center in encouraging student initiatives for learning, development and use of units of instruction and learning packages to provide a framework for learning, methods for modification of teaching to attain an emphasis on problem-solving and methods for faculty development.

d) Methods of evaluation: development of integrative examinations, design of evaluation instruments to measure achievement of competency-based objectives, evaluation of competencies in primary care, use of formative evaluation to encourage self-learning, methods of evaluation in competency-based clerkships, evaluation of the instructional process and long-term evaluation of the impact of medical studies.

This is a *partial* list of aspects of the program of medical studies which may have implications for medical education in the United States. It is anticipated that others would emerge during the next three years as a full complement of a six year curriculum is attained in Beersheva.

2. To develop materials related to these components in formats which will facilitate their utilization in the United States.

Once these components have been identified, related materials would be prepared to facilitate application within the context of American Medical Schools. The formats may include:

a) Manuals of organization and procedure.

b) Proto-types of instructional materials with appropriate examples.

c) Descriptive summaries and reports.

d) Articles for journals in medical education.

e) Presentations at appropriate conferences and meetings.

Formating the materials will require editing, modifying and translating. The resulting products would be produced in sufficient quantity to ensure their accessibility to interested Medical Schools in the United States.

3. To disseminate the results of the Beersheva experience, in part, through these materials, among American medical educators.

Communication of the Beersheva experience through materials developed under objective 2 would take several forms:

a) Visits by faculty of American medical schools to Beersheva. Direct contact of American medical educators with the program in Beersheva represents a most effective channel of communication. Precedents set during the first three years and described earlier in this report should be continued and expended.

b) Student exchange programs with American medical schools. Several such programs are currently being developed. They will expand student contacts which until now have been arranged informally.

c) An Academic Liaison Committee of American medical educators should be established. First steps in this direction have been taken. The American Liaison Committee would:

1. serve as a channel of communication for the sharing of the Beersheva experience in medical education with schools in the United States.

2. recommend and arrange bilateral or multilateral projects involving the participation of the Ben Gurion University of the Negev Medical School.

3. facilitate exchange programs for faculty and students.

The composition of the Liaison Committee would include medical educators in a variety of fields. The administrative infrastructure for the establishment of the Committee is currently being created.

d) Professional publications and presentations.

e) Findings from the Beersheva experiment will be published in the appropriate literature and will be presented at meetings of American medical educators.

References

The Executive Summary is abstracted from a series of reports issued under Contract #NO1-PE-44163. These consist of:

Interim Report I	July, 1975
Interim Report II	July, 1976
Final Report	September, 1977

Additional information concerning the Harvard-Ben Gurion University of the Negev Collaborative Project in Health Manpower Development may be obtained by referring to the pages of the respective reports as listed below.

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PREFACE

This document constitutes the final report submitted under the terms of Contract No. 971-PE-44163. It summarizes the objectives, activities and results of the collaborative project in health manpower development between the Center for Educational Development in Health and the Faculty of Health Sciences, Ben Gurion University of the Negev, from 7-1-1974 through 6-30-1977.

In an effort to keep this report succinct and focused on essentials, the following format has been adopted. The report is divided into eight sections. At the beginning of each section is a list of the highlights. This is followed by the narrative portion. The sections end with a set of references to earlier reports and other sources which may be consulted for a more detailed treatment of specified topics.

In submitting this report we should like to express our appreciation to the staff at the Bureau of Health Manpower who were of assistance throughout the project and to Professor Moshe Prywes, Dean of the Faculty of Health Sciences at the Ben Gurion University of the Negev without whose consistent collaboration the project would not have been possible.

HIGHLIGHTS

1. Introduction

1.1 Center for Educational Development in Health

- The Center for Educational Development in Health (CEDH), formerly at the Harvard School of Public Health and currently part of Boston University Medical Center is concerned with the *development of curricula* and the *training of teachers* for the health professions.
- Over the past 10 years, CEDH has trained over 600 health professionals in educational methodology and has participated in numerous collaborative projects in the development of curricula for the fields of *preventive medicine* and *primary care*.
- The Center has developed a *model for systematic course design*. Currently the model is being *field tested* to determine its applicability under diverse conditions both in the United States and abroad. This will permit modification of the approach to increase its range of applicability.

1.2 Faculty of Health Sciences, Ben Gurion University of the Negev

- In 1973, the Government of Israel authorized the establishment of a Faculty of Health Sciences at the Ben Gurion University of the Negev in Beersheva. A School of Medicine, the first component of the Faculty, was opened in 1974.
- The Medical School is part of a consortium of health agencies which serve the Negev region for which the following objectives have been delineated:
  1) to *develop and implement* an integrated program for delivery of preventive, curative and rehabilitative care to the total population of the Negev.
  2) to *merge* this integrated health care system with the Faculty of Health Sciences under a single authority.
  3) to *educate* in this new framework a different type of physician whose primary objective will be to provide service in an integrated hospital - community health care system.
- The Dean of the Medical School serves as director of the consortium and is thus responsible for all health care in the area. The merging of medical education with the delivery of health services under a single authority provides a *unique framework for educating physicians* who will have both the motivation and the competencies to serve as the providers of primary care in an economically disadvantaged region.

1.3 Rationale for a collaborative project

- Circumstances under which the experiment in medical education in Beersheva is being conducted afford an *opportunity not easily duplicated in the United States* to develop innovative approaches to the training of primary care physicians for service in an economically disadvantaged area.
- The Faculty of Health Sciences at the Ben Gurion University of the Negev was prepared to *adopt the CEDH model* in the process of curriculum development for its entire educational program and as a basis for its teacher training program.
- The problems associated with the development and implementation of an innovative curriculum in Beersheva are probably similar to those which face American medical educators.
- It is postulated that what is found to be feasible and effective under the difficult conditions of the Negev may well be *adaptable* to disadvantaged areas within the United States.

1. INTRODUCTION

1.1. Center for Educational Development in Health

The Center for Educational Development in Health has had a continuing interest in efforts, both in the United States and abroad, to design, implement and evaluate innovative approaches to the education of medical students for roles in primary care. Founded in 1956 at the Harvard School of Public Health as an interdepartmental program for teacher preparation, the Center is currently a part of the Institute for Health Policy at Boston University Medical Center.

The Center is specifically concerned with the process by which curriculum is formulated and to that end has developed a *model* for systematic curriculum design. The model which is outlined in Appendix I of this report is described in detail in Systematic Course Design for the Health Fields: Segall, Vanderschmidt, Burglass and Frostman, published in 1975 by John Wiley and Sons Inc. It comprises the following components:

1) Delineation of criteria for physician *performance*.

2) Derivation of competency-based educational *objectives*.

3) Selection of instructional *methods* appropriate to the objectives.

4) *Evaluation* of the instructional process in terms of the specified objectives.

Currently the model and associated instructional materials are being field tested to determine their applicability under diverse conditions so as to enable the Center to revise and modify the approach as a means of increasing its range of applicability. Field test sites include Medical Schools in the United States as well as programs for health manpower development in Latin America, Asia and Africa.

Since its inception, the focus of the Center's activities has been in the development and evaluation of curricula in the fields of *preventive medicine* and *primary care*.

Projects in which the Center is currently involved include:

1) A collaborative study with the Association of Teachers of Preventive Medicine in the development of *curricula for teaching preventive medicine* in Medical Schools in the United States.

2) A review of the *residency program in primary care* at the Boston University School of Medicine with a view to revising the curriculum.

3) A series of *courses in systematic course design* at the Harvard School of Public Health. Within the past 10 years, approximately 500 actual or potential teachers of public health, preventive medicine and primary care have enrolled in courses offered by the Center.

4) Several collaborative projects in the training of health workers for the delivery of *primary care in developing areas* of the world. These include training programs in Nigeria, Togo, Nepal, Malaysia, Bolivia, El Salvador and Peru.

These activities reflect the goals of the Center, its commitment to the improvement of training for physicians and other categories of health personnel both in the United States and abroad and its experience in the design and implementation of collaborative projects in health manpower development.

1.2. Faculty of Health Sciences, Ben Gurion University of the Negev [1]

In March 1973, the Government of Israel authorized the establishment of a Faculty of Health Sciences at the Ben Gurion University of the Negev in Beersheva. A School of Medicine, the first component of the Center, was to be opened in 1974. The Faculty was viewed as an *experiment in integrating medical education with the delivery of health care*. Its purpose is to not only educate health professionals to deliver care to an underserved, medically disadvantaged population, but to integrate the education of these health professionals with the care being delivered in such a way as to prepare and encourage them to remain in the underserved region and to provide health care to the population. The Negev covers an area of over 14,000 square kilometers and has a total population of approximately 500,000.

The Faculty of Health Sciences forms part of a *consortium* of health care agencies which includes the Ministry of Health and Kupat Cholim. The Kupat Cholim is the health insurance plan of the General Federation of Labour. It delivers health services to over 90% of the population in the Negev. The Dean of the Faculty serves as director of the consortium which has *three distinctive goals*. The first seeks to develop and implement an integrated program for delivery of preventive, curative and rehabilitative care to the total population of a defined region. The second envisages the merging of this integrated health care system with the Faculty of Health Sciences under a single authority. The third goal is to educate in this new framework a different type of physician whose primary objective will be to provide service in an integrated hospital-community health care system.

The goal of an *integrated program for the delivery of comprehensive care* recognizes that improvement in the level of health care requires better coordination and more efficient use of the regional resources available. The extent to which this goal can be achieved will be influenced by the geographic and social characteristics of the Negev region as well as by the particular constellation of health agencies which are active in the area.

The goal of *merging medical care and medical education* under a single authority has several dimensions. Firstly, it implies a potential impact of the Medical School on the quality of care through *direct involvement* in modifying the system for delivery of health services in the Negev. Traditionally, health manpower training and health services delivery have tended to move in separate orbits. More recently, there has been a trend towards

the establishment of collaborative arrangements which enable the resources of Medical Schools to be utilised to explore new patterns of health care delivery.

The approach in many countries has been to initiate limited demonstration projects, which, if successful, would be replicated on a wider scale. Such an approach has encountered several difficulties. Often the project has evolved into a showpiece which requires resources well beyond those available within the existing health care system. In this case, its role in stimulating more broadly based change may be severely compromised. Another difficulty may arise if the project encompasses only one aspect of health care such as ambulatory services. Relating this aspect to other components of the health care system such as hospitals and public health facilities which are not included as part of the demonstration may prove to be problematic.

Rarely has a Medical School participated in the planning and implementation of all levels of health services for an *entire region*. This is the intent in Beersheva which, in the context of the Negev, implies involving in the educational process not only a major teaching hospital but all sectors of the health care system including the peripheral ambulatory services in the rural and developing areas.

There is a second dimension to this goal. Within the collaborative framework engendered by a single authority, it will be possible to examine the role of the physician in different health care settings in terms of the competencies required for professional performance. Educational objectives for the Medical School derived from the real world of professional practice can then be formulated.

Of perhaps greater significance is the potential to bring about changes in the role of the physician within the system. By anchoring the educational program in all facets of the health care delivery system, it both will stimulate and will reflect changes in the patterns of health services. It is the opportunity for decisive involvement in determing the roles and responsibilities for which the school is to prepare students which will characterize the interface between medical education and medical care in Beersheva. If successful, it may give rise to a new consonance between the process of medical education and the full range of health needs of the community.

The third goal concerns the *orientation of studies at the Medical School*. The commitment is to educating physicians whose primary objective will be to provide medical service in a combined hospital-community system. This commitment implies that along with the basic elements of medical education the *primary care dimension* of medical practice will receive an emphasis which in other Medical Schools is usually accorded to specialty medicine. Two consequences are anticipated. Firstly, a significant proportion of students will be attracted to careers in primary care. Secondly, all students, whatever their eventual career choices, will have acquired sensitivity to the primary care dimension of all types of medical practice as well as basic competencies in this domain.

Available to the Medical School in developing and implementing this type of curriculum are the resources of the regional health care system and those of the Ben Gurion University of the Negev. Progress in achieving the first two goals as they relate to changes in the organization of health services

is a pre-requisite to meeting the educational objectives. Existing barriers which separate the hospital from community health clinics and preventive services from curative and rehabilitative care must be breached not only to revitalize and improve the quality of care, but also to provide the range of learning experiences which are essential for the education of a new type of physician.

1.3. Rationale for a Collaborative Project in Health Manpower Development

The Harvard-Beersheva Collaborative Project was initially designed to field test the CEDH curriculum development model in a setting which emphasized the training of primary care physicians for service roles in an underserved area. The particular circumstances which characterized the new Medical School in Beersheva afforded a *unique opportunity* to test an innovative curriculum, free of the constraints of tradition found in many other Medical Schools.

The problems associated with such a curriculum are similar to those which face medical educators in this country. However, circumstances under which the experiment in Beersheva is being conducted provide an opportunity not easily duplicated in the United States to develop innovative approaches to the solution of these problems. These circumstances include:

1) An *institutional commitment* to emphasize the training of physicians for roles in the field of primary care.

2) A *contractual relationship* between the Kupat Cholim (Workers Sick Fund), the Ministry of Health and the Faculty of Health Sciences of Ben Gurion University of the Negev under which the Medical School is an integral part of the consortium responsible for the delivery of all medical care in the Negev region. The Medical School thus has an opportunity to modify existing health services, and not only to train physicians. This means that as a new type of physician is being trained, the health care system within which he will be expected to work is being revised. One of the results of this revision should be the creation of a professional setting in which the Beersheva graduates will be able to function effectively in accordance with the training which they have acquired.

3) An *economic, social and cultural environment* which reflects the problems of bringing medical care and education to a disadvantaged area. An important implication is that what has been found to be feasible and effective under the difficult conditions of the Negev may very well be adaptable to disadvantaged areas within the United States.

4) *A frontier mentality* which is characteristic not only of the Medical School but which prevades many aspects of life in Beersheva. There is a willingness to think through problems without being bound by constraints of tradition, and the Byzantine network of vested interests which are found in many Medical Schools.

5) A level of *administrative flexibility* which is perhaps more conducive to the introduction of change than is a well-functioning organization. The general lack of clear-cut administrative definition is, perhaps in its initial phases, more hospitable and responsive to innovation.

6) Support for the innovative approach at the highest University and Medical School levels. This type of support does not necessarily permeate down to middle level decision makers, but does reduce the need for political compromises in order to continue with the program.

7) An institutional *commitment to the use of the CEDH model* in the curriculum development process. This commitment was given by the Dean in 1974 and reaffirmed by the Faculty Council at its first meeting in 1975.

In the light of these considerations, it was felt that a collaborative project involving the Center for Educational Development in Health and the Faculty of Health Sciences at the Ben Gurion University of the Negev would have potential benefits both for Beersheva and for medical education in the United States.

REFERENCES

1) The following sections of earlier reports and other documents may be consulted for additional information concerning the Faculty of Health Sciences at the Ben Gurion University of the Negev.

Status of the Medical School of Ben Gurion University at the outset of the contract (Interim Report I; page 21)

Background of conditions in Beersheva in year 02 (Interim Report II; page 16)

Final Report of Contract submitted by M. Prywes, Principal Investigator to the Bureau of Health Manpower, HRA, October 1975. This report covers the initial steps taken to establish the Faculty of Health Sciences and the consortium of health agencies in the Negev.

HIGHLIGHTS

2. Objectives

The objectives of the CEDH-Ben Gurion Collaborative Project in Health Manpower Development under the terms of Contract No. NO1-PE-44163 are:

2.1 To field test the CEDH model for systematic curriculum development

The following major components are included:

- Development of a mastery description
- Development of educational goals and competency-based objectives
- Design of the curriculum
- Development of an evaluation plan

2.2 To design, conduct and evaluate a Faculty Teaching Laboratory

The steps to be followed include:

- Identify the teaching competencies needed by faculty at the Medical School.
- Determine the most effective means, given the resources and constraints in Beersheva, by which members of the faculty could acquire these competencies.
- Provide opportunities for faculty to acquire the competencies identified.
- Evaluate outcomes of the faculty development program.

2.3 To establish and maintain a collaborative relationship between the Center for Educational Development in Health and the Ben Gurion University of the Negev

The collaborative relationship to be established includes:

- Participation of CEDH staff in the development, implementation and evaluation of the curriculum for the School of Medicine in Beersheva. This will involve primarily introduction of the CEDH model as a basis for curriculum development and faculty training
- Dissemination through CEDH of the results of the Beersheva experience among medical educators in the United States.

2. OBJECTIVES

The objectives of the CEDH-Beersheva Collaborative Project in Health Manpower Development are:

2.1 To field test the CEDH Model for systematic curriculum development

The model is described in some detail in the book, Systematic Course Design for the Health Fields, Segall / Vanderschmidt / Burglass / Frostman, John Wiley and Sons, 1975.

It is anticipated that the field test process will include the following major components:

A. Development of a mastery description.

A mastery description for the role of the primary care physician based on a performance analysis and on the new patterns of medical care delivery envisaged by the Health Sciences Center. Expected professional performance by primary care physicians functioning within the health care system in the Negev region of Israel will be specified. A description of mastery will be developed through a process of task analysis and field verification, to serve as the basis for developing competency-based educational goals and instructional objectives and to provide a set of operational criteria for evaluating the medical school in terms of how graduates perform in their various roles.

B. Development of goals and objectives.

Broad institutional goals and competency-based objectives for specific segments of instruction will be developed. These will be derived from the criteria for professional performance. Many of the goals and objectives developed by the Health Science Center, University of the Negev, which is committed to the preparation of primary care physicians, will be relevant to conditions prevailing at medical schools in the United States. The use of competency-based objectives by American educators of primary care physicians may be stimulated by the availability of examples developed in Beersheva.

C. Curriculum design.

A curriculum will be developed to meet the educational objectives which have been defined. It is anticipated that criteria for professional performance and educational objectives will emphasize those competencies which are related to the provision of primary care. The curriculum which evolves is, therefore, likely to incorporate innovative educational experiences designed to facilitate student acquisition of attitudes, knowledge, and skills needed by the primary care physician.

D. Development of an evaluation plan.

An evaluation plan will be developed to determine the extent to which the curriculum is effective in achieving the specified educational objectives and to analyze the relationship between variables such as student characteristics and type of instrument which impact on the effectiveness of instruction. Further, the evaluation plan will determine the outcome of the educational process at the Center in terms of physician functions and practice settings (e.g., location of practice, type of practice, and relationship to the overall health care system, participation in programs for continuing medical education, and continuing relationship with the Center). Further, formative and summative evaluation instruments will be developed to measure the extent to which the curriculum is successful in achieving the specified objectives in terms of competencies acquired by students.

2.2 To design, conduct and evaluate a Faculty Teaching Laboratory

The Faculty Teaching Laboratory will be based on experience of the Program at Harvard. It may include the following activities:

A. The first stage will be a preliminary analysis consisting of four components: (1) specifying a set of teaching practices considered to be effective in facilitating student learning; (2) assessing actual teaching practices among potential client faculty; (3) comparing actual practices with the initial set of specified effective teaching practices to delineate areas of performance discrepancies; and (4) identifying those performance discrepancies which in-service faculty training might help resolve. The analysis shall include training requirements among "field faculty" (consisting of primary care physicians in the community) as well as faculty based at the pre-clinical and clinical academic center.

B. The second stage will focus on identification of Laboratory goals, with the following components: identifying student learning needs; designing curriculum including specification and analysis of instructional objectives; selecting and utilizing appropriate teaching methods and media to achieve specific objectives; developing strategies and instruments for the evaluation of educational programs; formulating educational policy for training in the health sciences; and specifying patterns of continuing education through which participants may continue to acquire increased competence in teaching after completion of training offered by the Laboratory.

C. The third stage will focus on development of instructional resources and curriculum, with the following components: development of a curriculum for the Laboratory which will achieve the objectives specified in the second stage; mobilization of instructional resources to implement the curriculum and development of mechanisms for access to the Laboratory's resources through formal courses, workshops, seminars, and tutorials.

2.3 To establish and maintain a collaborative relationship between the Center for Educational Development in Health and the Ben Gurion University of the Negev

A continuing relationship will be established and maintained between CEDH and the University of the Negev, to permit the use of the Faculty of Health Sciences of the Ben Gurion University of the Negev as a field site for training students from the Center and to permit the long-term evaluation of the educational process at the Medical School in Beersheva.

HIGHLIGHTS

3. Methods

Methods to achieve the objectives specified under Contract NO1-PE-44163 include:

3.1 Establishment of a Curriculum Development Unit

- The principal instrument for implementing the terms of this contract is the Curriculum Development Unit in Beersheva through which input from the Center for Educational Development in Health is channeled. The Unit, established in 1974, has as its *purpose* to provide staff support, mobilize instructional resources, assume responsibility for faculty development activities and oversee implementation of the evaluation system. It has fulfilled the following functions:

  Recruitment and training of teachers

  Management of the curriculum development process

  Evaluation of student performance and the learning process.

- The Unit is *staffed* by a small number of full time professionals whose efforts are supplemented by part-time operational consultants as well as a small number of resource consultants who provide consultation on a continuous or ad hoc basis but do not assume operational responsibilities.

- The Unit consists of three sections; planning and evaluation, curriculum implementation, and learning resources.

3.2 Establishment of a Process for Curricula Development

The curriculum development process in Beersheva consists of several stages.

An initial preparatory stage is concerned with recruiting faculty, communicating the basic philosophy of the Medical School and reaching consensus relative to broad educational goals. This is accomplished through a series of informal reference groups which formulate *guidelines* for developing the program of instruction.

The second stage is one of detailed curriculum planning. Subject area committees on the basis of the initial guidelines develop competency-based objectives, select teaching methods and develop evaluation plans. The proposals of the various subject area committees are then collated into a *comprehensive projection* for each phase of the curriculum.

In a third stage, these projections are reviewed and revised by co-ordinating councils consisting of all course co-ordinators for each of the several phases of the curriculum. The councils may require that instructional objectives be modified, redelineate subject area boundaries and allocate instructional resources. A *definitive curriculum* is then ellaborated.

The fourth stage is one of *implementation* which is supervised by executive committees appointed by the co-ordinating councils for the respective phases of the curriculum.

A fifth stage occurs after the completion of each course and addresses the need for *curriculum modification* in the light of feedback from examinations and assessment of courses by students.

The curriculum development process is characterized by:

- a *wide basis* for decision making involving broad participation on the part of students and teachers
- an approach which emphasizes the notion of curriculum development through *successive approximations*. Implementation of objectives is *phased* over a period of time appropriate to the resources and constraints.

3.3 Communication of Results to Medical Educators in the United States

Related to objective 3 of the present contract is the dissemination of results of the Beersheva experiment among American medical educators. This has taken several forms:

- *Personal visits* by faculty from medical schools in the United States has thus far been the most effective way of communicating the Beersheva experience. A total of *74 American faculty* members from *30 medical schools* across the United States have visited the Faculty of Health Sciences at the Ben Gurion University of the Negev. Over 70% spent more than two weeks in Beersheva.

- The experience gained in Beersheva is being incorporated in the *revision of the basic CEDH model* for systematic curriculum development. These modifications are reflected in all activities of the Center. These include the Center's ongoing teacher training program in which faculty from Medical Schools across the United States participate and a collaborative project with the Association of Teachers of Preventive Medicine to develop curriculum in preventive medicine for American Medical Schools.

- A third method of dissemination is through an *Academic Liaison Committee*. First steps to establish this committee were taken in the latter part of year 03 of the present contract.

3. METHODS

3.1 Creation of a Curriculum Development Unit[1]

In 1974 the first step taken to implement the CEDH-Beersheva Collaborative Project in Health Manpower Development was the establishment of a Curriculum Development Unit within the framework of the Dean's Office at the Faculty of Health Sciences, Ben Gurion University of the Negev. The purpose of the Unit was to provide staff support, mobilize instructional resources, assume responsibility for faculty development activities and oversee implementation of the evaluation system. During the first three years of the Medical School the Unit has functioned in a leadership role with respect to curriculum development and at the same time has sought to be responsive to the needs of faculty and students. The Unit has maintained liaison with the Center for Educational Development in Health in all matters related to the present contract.

3.1.1 Functions

The Curriculum Development Unit functions in the following areas:

Recruitment and training of teachers.

A. Collaborating in the recruitment and selection of teachers by:

1) identifying potential teachers among the various faculties of Ben Gurion University and the several health care facilities in the Negev (i.e., Kupat Cholim, Ministry of Health, Malben).

2) recruiting potential faculty from other parts of Israel and from abroad.

3) establishing criteria for selection of teachers related to teaching ability and interest.

4) evaluating potential faculty according to these criteria.

5) providing the Committee on Faculty Appointments with the results of such evaluation.

B. Operating a faculty teaching laboratory

The functions of the Faculty Teaching Laboratory include the provisions of:

1) initial orientation of new faculty members concerning the goals, curriculum and organization of the educational program.

2) basic training for the process of systematic course development including specification of objectives, selection of teaching methods and evaluation of instruction.

3) appointments for additional training in the use of specific teaching methods (e.g., small group teaching, individualized instruction, audio-visual aids).

4) opportunities for additional training in evaluation including testing techniques and analysis of test results.

5) bibliographic support in the areas of educational methodology, teaching programs in the various fields related to medical education and documentation of experience of other medical schools.

Curriculum development

A. Participating in the development of broad educational goals for the Medical School by developing a mastery description for the primary care physician within the Israeli system of health services.

B. Establishing subject area committees to develop, plan and implement the curriculum.

C. Providing staff support for the subject area committees including technical assistance, administrative support and bibliographic resources.

D. Establishing and providing staff support for coordinating committees for each phase of the curriculum to approve and assure integration of the various courses.

E. Formulating draft proposals for consideration by subject area and coordinating committees.

F. Presenting provisional curriculum proposals as approved by the coordinating committee to the Educational Committee of the Faculty for ratification.

Implementation of curriculum.

A. Providing ongoing support for teachers in the selection and utilization of appropriate teaching methods and resources.

B. Making available educational materials as required. Such materials may be secured from existing sources or may have to be produced locally. Included are:

1) educational modules. These consist of "units of instruction" which encompass objectives, pre-requisites, pre, post, and self tests, specification of teaching methods and materials. In most instances, these modules are produced in Beersheva and reflect the specific needs of the Medical School.

2) audio-visual materials, including books, reprints, slides, films, models, audio-tapes and video-tapes.

C. Modifying the curriculum on an ongoing basis in response to:

1) logistic problems which may be expected to arise as a function of the constraints inherent in the Beersheva situation.

2) feed-back from evaluation procedures.

3) changes in the health care system of the Negev as envisaged in the original design of the Center for Health Sciences in the Negev.

Evaluation of the curriculum.

Maintaining a capacity for evaluating the educational program. This capacity will relate to:

A. development of instruments to measure students' performance.

B. procedures for utilising evaluation results to modify criteria for admission of students, selection of teachers and development of curriculum.

Liaison activities.

Maintaining appropriate liaison with:

A. other components of the Medical School.

B. other faculties within the University.

C. other health professions schools both within and outside of Israel.

3.1.2 Staffing Pattern

To carry out the functions described in the preceding section, the following staffing pattern was established.

1) Core staff. The core staff consists of a relatively small number of full-time professionals. Its functions are: a) to assure the day-to-day operations of the Curriculum Development Unit, b) to provide staff support for other operational units concerned with the teaching program, c) to formulate policy recommendations with respect to the curriculum for review and consideration by other appropriate units of the Medical School, and d) to take the initiative in matters relating to the development of curriculum.

2) Operational consultants. A panel of operational consultants was established, consisting of persons who carry defined responsibilities on a part-time basis. For the most part, operational consultants are resident in Beersheva, and are employed either by the University or by Kupat Cholim. Operational consultants may be appointed on an ad hoc basis or for a specified period of time.

Over the course of the first 3 years, the panel of operational consultants has included:

a. Coordinators for subject areas of Phase I:

basic sciences
clinical teaching
community medicine

b. Coordinators for subject areas of Phase II:

medical sciences
clinical teaching
community medicine

c. Coordinators for Phase III

integrated organ systems
clinical clerkships
community medicine

3) Resource consultants. The panel of resource consultants consists of persons who provide consultation services on a continuous or an ad hoc basis, but do not assume operational responsibilities. They may be drawn from Beersheva, other parts of Israel, or from abroad.

3.1.3 Organization

During the course of the first three years several sections were established within the Curriculum Development Unit. These sections were assigned specific responsibilities as described below:

Planning and Evaluation Section:

a. to develop sets of curricular options for each phase of the educational program.

b. to establish and assist subject area committees in the planning of instruction. This includes formulation of objectives, selection of teaching methods and selection of methods for evaluation.

c. to collaborate with the coordinating committees and their executives in planning for horizontal and vertical integration within the curriculum.

d. to plan and implement the training of teachers in educational methods

e. to assist teachers in the development of instructional units.

f. to identify options concerned with the evaluation of student performance and the teaching process for each stage of the educational program.

g. to assist teachers in the design of evaluation instruments, test items and procedures for analyzing test results.

h. to provide consultation to the other sections of the Unit.

i. to assist teachers as needed in the modification of course syllabi. Factors such as unforeseen logistic problems, feedback from the evaluation process and changes in the prerequisites may necessitate modification of a particular syllabus.

Curriculum Implementation Section

a. to establish an annual schedule of activities for each year of the educational program. This schedule of activities is to be completed at least one month prior to the academic year and will include:

   1. a course schedule for the academic year.
   2. a schedule for the administration of all tests, including pre-tests, progress tests, posttests and annual examinations.
   3. a schedule for the provision of feedback to students concerning the results of all exams other than self-tests.
   4. a schedule of opportunities for remediation available to students for each progress test.
   5. a schedule of meetings of the coordinating committees and their executives.
   6. a schedule of all debriefing sessions (post-course evaluations).

b. to implement the annual schedule and to take appropriate measures where changes are required.

c. to provide the faculty secretary with a list of facilities required for teaching.

d. to assist teachers with logistic problems in the implementation of courses.

e. to assure the availability of printed and mimeographed instructional material when and where they are required.

f. to assist subject area committees in developing syllabi as a function of existing resources and constraints.

g. to collaborate with the Executive Committee for each year of the program of studies in the implementation of the curriculum.

Learning Resources Section:

The functions of the Learning Resources Center are listed below:

a. to plan and implement a learning resources facility.

b. to design and produce audio-visual software.

c. to develop produce and field test self-instructional materials.

d. to participate in teacher training activities.

e. to acquire hardware components of audio-visual systems.

f. to supply appropriate audio-visuals to teachers.

g. to consult with students and instructors on program requests.

h. to coordinate resources of the Center with other University resource centers.

3.2 Establishment of a Process for Curriculum Development[2]

Once a Curriculum Development Unit had been established (See Section 3.1 of this report) the curriculum development process was initiated. The first three years of experience in Beersheva provide the case history of an attempt to introduce innovation in medical education under circumstances characterized by meagre resources, an unstable infrastructure, an atmosphere open to change and strong leadership.

It should be noted that the context within which innovation in Beersheva occurs is set by the goals of the medical school. These set the terms of reference for assessment of all curriculum proposals. In considering possible educational alternatives, the effort is to select those which facilitate the attainment of the institutional goals whether they be of a traditional or innovative nature. There is no commitment to novelty as an end in itself.

From the outset, the curriculum development process in Beersheva has involved several stages. An initial preparatory stage is concerned with recruiting potential faculty, communicating the basic philosophy of the Medical School and reaching consensus relative to broad educational goals and curricular options. At this stage informal reference groups are constituted usually according to discipline or professional background. The purpose is to provide forums for discussion of how teaching in the individual disciplines might be related to the institutional goals and to begin the process of defining competency based objectives. The recommendations which emerge serve as guidelines for the next stage which is devoted to detailed curriculum planning.

The second stage begins with a review of these recommendations by the staff of the curriculum development unit. These are merged into a first approximation of the curricular framework which is then used to develop each segment of the program in further detail. This task is entrusted to subject area planning committees, which include clinicians and basic scientists. A set of competency-based objectives is specified, methods of teaching are selected, and an evaluation plan is elaborated. The planning committees also indicate the resources needed for implementation and designate the teachers who will prepare units of instruction and assume direct responsibility for courses. In all these activities, the planning committees are aided by staff of the curriculum development unit. The proposals of the various subject area planning committees are then collated into a comprehensive projection for each phase of the curriculum.

In a third stage, these projections are presented for ratification by a representative co-ordinating council. There is a council consisting of course co-ordinators for each of the several phases of the curriculum. It is the responsibility of the councils to review the curriculum projection in terms of relevance of instructional objectives to institutional goals, consonance of teaching methods proposed with the specified objectives and the weight assigned to each segment of the curriculum as indicated by the instructional resources requested. The co-ordinating councils have the authority to require changes in instructional objectives, to redelineate the subject area boundaries, and to make final determination of the manner in which instructional resources including curriculum time are allocated.

The fourth stage is one of implementation and involves faculty who are engaged in teaching the courses, an executive committee of each co-ordinating council, and the curriculum development unit. The executive committee meets at frequent intervals to resolve problems of implementation as perceived by teachers and students and to deal with logistic problems which arise. Individual teachers participate in its deliberations as appropriate.

A fifth stage occurs after completion of each course and addresses the need for curriculum modification in the light of feedback from different sources including examinations and assessment of courses by students. These data are made available to the individual course planning committees which generate recommendations for revision of objectives or methods of teaching. This completes a full cycle of the curriculum development process which is repeated annually.

Certain aspects of this approach to curriculum development may facilitate the introduction of innovation. Among the more important is probably the *wide base for decision-making*. Broad participation on the part of teachers and students is encouraged and opportunities are provided to express and exchange opinions before decisions are taken at each stage of the process. Although the criteria for curricular decisions form part of institutional policy, authority for their application is broadly delegated. These procedures of governance preclude imposition by administrative fiat.

There are short term risks associated with this approach which may decrease the rate at which innovation can be introduced. Chances of success, however, are enhanced by the involvement and commitment of those most directly affected. In terms of long range continuity, change introduced in this manner may be more likely to endure than that which relies solely on the impact of charismatic leadership or bureaucratic manipulation.

The rate at which innovation is introduced is related to the notion of proceeding by *successive approximations*. A potential pitfall in planning for change consists in envisaging the outcome in dichotomous terms; either the innovation in its entirety will be accomplished immediately or it will never occur at all. Often it is neither feasible nor desirable that all aspects of an innovative measure be instituted simultaneously. Unrealistic expectations can lead to premature and unwarranted pessimism resulting in the abandonment of effort. The approach by successive approximations utilized in Beersheva adapts the rate of change to the resources available and the constraints not immediately amenable to control. Objectives are phased over a period of time appropriate to the circumstances and motivation is reinforced as each successive approximation is achieved.

This approach also provides for ongoing modification in the light of experience. The evaluation procedures built into the curriculum development process ensure an annual review of each instructional segment which may result in its retention, revision or elimination.

3.3 Communication of Results to Medical Educators in the United States

An essential component of the present contract is the dissemination of results of the Beersheva experience among medical educations in the United States. The following methods have been used:

1) Program for visiting faculty and students from the United States

Personal visits by faculty and students from Medical Schools in the United States has thus far been the most effective way of communicating. Over 70% of visitors spend more than two weeks in Beersheva. A personal program is developed for each visitor taking into account his or her background, areas of interest and role in the field of medical education. Visitors are encouraged to meet with members of the Curriculum Unit and observe the way in which the educational program functions. Visitors are also invited to participate in appropriate ways as, for example, giving guest lectures or meeting with physicians and students. There is generally no language barrier except insofar as written documentation is concerned. This is usually available only in Hebrew. Many visitors spend several months in Beersheva. In these instances the visitor becomes actively involved in one or more programs of the Medical School. Contact is maintained through correspondence after the visitor has returned to the United States.

In year 01 there were twelve visiting faculty from the United States. In year 02 twenty-nine American faculty members from medical schools across the United States visited the Ben Gurion University of the Negev Medical School. In year 02 there were, in addition, thirteen students from American schools of medicine and public health who worked on various projects in Beersheva. In year 03 there were 33 visiting faculty from the U.S.A. Medical Schools of the following universities were represented.

Association of American Medical Colleges

Boston University	University of California
Brown University	University of Chicago
Case-Western Reserve Medical School	University of Colorado
Dartmouth University	University of Connecticut
Georgetown University	University of Illinois
Harvard Medical School	University of Miami
Harvard University	University of Minnesota
Hershey Medical School	University of North Carolina
Johns Hopkins University	University of Pennsylvania
Medical School of Wisconsin	University of Pittsburgh
Michigan State University	University of South Carolina
Mount Sinai Medical School	University of Tennessee
New York Medical College	University of Washington
Northwestern University	Yale Universtiy
State University of New York	Yeshiva University

2) Incorporation of the Beersheva experience into the activities of the Center for Educational Development in Health

A second way of disseminating information generated at Beersheva has been through the activities of the Center for Educational Development in Health.

Experience gained at Beersheva is being incorporated into the teaching materials of the Center. Examples of the Center's activities in which these materials have been used include the ongoing teacher training program in which faculty from Medical Schools across the country participate; a collaborative project with the Association of Teachers of Preventive Medicine to develop curriculum in preventive medicine for American medical schools (1975-); a regional Conference on Health Manpower Development for Underserved Areas of New England (1976); and a review of the residency program in primary care at the Boston University School of Medicine (1977). In these various efforts the use of the CEDH model for systematic curriculum design is being modified in the light of experience with its application in Beersheva.

3) Academic Liaison Committee

A third method of dissemination is through an Academic Liaison Committee currently being organized. The functions of the Committee will include:

(1) to serve as a channel of communication for the sharing of the Beersheva experience in medical education with schools in the United States

(2) to recommend and arrange bilateral or multilateral projects involving the participation of the Ben Gurion University of the Negev Medical School

(3) to facilitate exchange programs for faculty and students

(4) to serve as a "clearing-house" for the dissemination of instructional materials developed in Beersheva to interested Medical Schools in the United States.

It is anticipated that the American Liaison Committee will include faculty from Medical Schools in all regions of the United States, and will cover a broad range of disciplines.

4) Other means of dissemination

Other means of communicating the Beersheva experience include:

(1) Publications. It was decided not to publish reports on any phase of the educational program until several years of experience had been accumulated. Publications on this dimension of the Beersheva experience are planned to begin in year 03. A description of the student selection process has already been published (Student selection in the School of Medicine, Ben Gurion University of the Negev: A. Antonovsky: Association for Medical Education in Europe: 1976).

(2) Professional Meetings. A presentation based on the Beersheva experience was presented at the annual meeting of the American Public Health Association in the fall of 1976. Presentations are also planned at future meetings of the Association of American Medical Colleges (1978 meeting).

(3) Dissemination of instructional materials. It is too early to disseminate instructional materials developed in Beersheva. These are still being tested and revised. There is little doubt, however, that when these materials reach the definitive stage that they will be of interest and possible utility to medical educators in the United States.

(4) Special Conferences. Two special conferences were held in year 02 dealing with the planning of teaching primary care clinics. The first was held in Beersheva with the participation of faculty from the University of South Carolina Medical School. The second was held in Boston with the participation of faculty from Harvard Medical School, Harvard School of Public Health and the Ben Gurion University of the Negev Medical School. Additional conferences of this nature are anticipated.

3.4 Timetable

A timetable covering the entire 3 year period of Contract NO1-PE-44163 (7-1-74 - 6-30-77) is shown on the following pages.

Contract NOI-PE-44163
Description of activities for the entire contractual period

1974	Contract Schedule	Academic Schedule	Curriculum Development	Curriculum Implementation	Curriculum Evaluation
July 1	Contract begins		Curriculum development process begins		
July 30					
Sept. 30	End first quarter year 01		First draft 6 year curriculum completed First draft for year 01; 1st cohort completed		
Nov. 4		First semester begins year 01; first cohort	Curriculum for year 01; first semester; first cohort; completed	Implementation of cohort 1; year 01 curriculum begins	
Dec. 31	End second quarter year 01		Curriculum development for year 02; first cohort begins		

Contract NOI-PE-44163
Description of activities for the entire contractual period

1975 :	Contract Schedule	Academic Schedule	Curriculum Development	Curriculum Implementation	Curriculum Evaluation
March 5		Second semester begins year 01; first	Curriculum for year 01; 2nd Semester; 1st cohort completed		
March 31	End third quarter year 01		First draft of curriculum for year 02; 1st cohort completed		
June 30	End year 01		Revision of curriculum for year 01; 2nd cohort begins		
July 30		End of academic year	Development of 2nd draft of 6 year curriculum begins	Implementation of cohort 1; year 01 curriculum completed	
Sept. 30	End first quarter year 02		Revision of curriculum for year 01; 2nd cohort completed 2nd draft of 6 year curriculum completed		Summative evaluation of cohort 1 year 01 completed
Nov. 4		First semester begins year 02; first cohort year 01; second cohort	Curriculum for year 02; 1st semester; 1st cohort completed	Implementation of cohort 1; year 02 curriculum begins Implementation of cohort 2; year 01 curriculum begins	
Dec. 31	End second quarter year		Curriculum development for year 03; first cohort begins		

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Contract NO1-PE-44163
Description of activities for the entire contractual period

1976	Contract Schedule	Academic Schedule	Curriculum Development	Curriculum Implementation	Curriculum Evaluation
March 5		Second semester begins year 02; first cohort year 01; second cohort	Curriculum for year 02; 2nd semester; 1st cohort completed		
March 31	End third quarter year 02		First draft of curriculum for year 03; 1st cohort completed		
June 30	End year 02		Revision of curriculum for year 01; 3rd cohort begins Revision of curriculum for year 02; 2nd cohort begins		
July 30		End of academic year	Development of 3rd draft of 6 year curriculum begins	Implementation of cohort 1; year 02 curriculum completed Implementation of cohort 2; year 01 curriculum completed	
Sept. 30	End first quarter year		Revision of curriculum for year 01; 3rd cohort completed Revision of curriculum for year 02; 2nd cohort completed 3rd draft of 6 year curriculum completed		Summative evaluation of cohort 1 year 02 completed Summative evaluation of cohort 2 year 01 completed

Nov. 4		First semester begins year 03; first cohort year 02; second cohort year 01; third cohort	Curriculum for year 03; 1st semester; 1st cohort completed	Implementation of cohort 1; year 03 curriculum begins Implementation of cohort 2; year 02 curriculum begins Implementation of cohort 3; year 01 curriculum begins
Dec. 31	End second quarter year 03		Curriculum development for year 04; first cohort begins	

Contract NO1-PE-44163
Description of activities for the entire contractual period

1977	Contract Schedule	Academic Schedule	Curriculum Development	Curriculum Implementation	Curriculum Evaluation
March 5		Second semester begins year 03; first cohort year 03; second cohort year 01; first cohort	Curriculum for year 03; second semester; 1st cohort completed		
March 31	End third quarter year 03		First draft of curriculum for year 04; 1st cohort completed		
June 30	End year 03		Revision of curriculum for year 01; 4th cohort begins Revision of curriculum for year 02; 3rd cohort begins Revision of curriculum for year 03; 2nd cohort begins		

REFERENCES

1) The Curriculum Development Unit is further described in:

Interim Report I ; page 3-1

Interim Report II; page 30

2) The process for curriculum development is further described in:

Interim Report I ; page 5-1

Interim Report II; page 67

HIGHLIGHTS

4. The Curriculum in Beersheva

In this section the curriculum as it was developed and implemented in Beersheva is described. It represents one of the principal outcomes achieved as a result of the collaboration between the Center for Educational Development in Health and the Faculty of Health Sciences at the Ben Gurion University of the Negev.

The curriculum is designed to be responsive to *three major issues* which confront medical education throughout the world today.

1) The changing role of the physician

- The emphasis in Beersheva is on preparing physicians who can function effectively as either *generalists* or *specialists* in an *integrated hospital-community* system of health care.
- The distinguishing characteristic of this role is the responsibility it entails for participating in the delivery of *primary care* services. This is viewed as an essential component in the redefinition of the physicians' role to which the Medical School is committed.
- The frame of reference for integrating knowledge, skills and attitudes related to primary care which informs all aspects of the curriculum is based on the *natural history of disease concept*.

2) The information explosion in medicine

- The curriculum is designed in terms of *competency-based learning objectives* which are derived from analysis of *physician performance*. This approach tends to diminish the arbitrary element in curricular decision-making by relating medical studies at the undergraduate level to clearly defined expectations of future performance in the professional setting.
- Beyond the consideration of curriculum content, there is a need to address the nature of the *learning process* itself as a means for preparing students to *adapt* to the constantly changing technological and social basis of medical process. This has resulted in an emphasis on:
    a) acquisition of *independent learning styles* and skills in *self assessment* by the student.
    b) development of *problem-solving skills* as applied to the basic sciences, clinical practice and the solution of community health problems.

3) Relevance in Medical Education

- The *spiral* concept of curriculum adopted in Beersheva is based on the premise that learning and retention occur more effectively when *reinforced* concurrently across diverse components of the curriculum and longitudinally over successive phases of the program of studies.

- Three principal curricular components are delineated: *basic sciences, personal health care* and *public health.* Instruction in each component begins in the *first year* and continues at successive levels of sophistication through the end of studies. From the outset, appropriate experience in clinical and public health settings is interwoven with acquisition of a knowledge base in the natural and medical sciences.

- Teaching is *integrated* both *horizontally,* among subject areas within a particular phase of the curriculum and *vertically* among subject areas over successive phases.

- The spiral concept of curriculum provides for learning through *successive approximations* over the entire six year program. Just as clinical studies commence in the first year and continue until graduation, so the basic sciences are not confined to the early portion of the curriculum. Both proceed in tandem, drawing from whatever fields of knowledge can contribute to solving the particular problem under consideration.

The curriculum projection is based on these considerations and encompasses *six and a half years of study* divided into five phases. Under the present contract the first three years were implemented.

Phase I - coincides with the first year of studies. Students acquire a foundation in the physical, natural and social sciences. Concurrently, they begin clinical studies and learn basic skills in public health.

Phase II - comprises the second year of studies in which the basic medical sciences are introduced and further clinical and public health competencies are acquired.

Phase III - extends from the third through the fifth year of study. It consists of integrated organ system modules which alternate with clinical clerkships.

Phase IV - is a one year rotating internship required under the Israeli system of medical education.

Phase V - offers students an opportunity to return to an academic setting for variable periods of time to engage in further elective work and study following completion of the internship.

Elements of the curriculum which are particularly characteristic of the Beersheva approach and what may be adaptable to medical education in the United States include:

- Early Clinical Program: During the first two years students are involved in clinical studies one full day each week and one full month at the end of the academic year. They acquire basic skills in *communication, observation* and *medical intervention* as a basis for subsequent study of history-taking, physical examination and patient care. These skills are taught in formal courses and applied in *six clinical tracks* which provide for learning experiences in health clinics, outpatient settings, hospitals, public health stations, chronic disease facilities and health-related institutions.

- Integrated Public Health Teaching: The teaching of public health is *integrated* with the basic sciences and clinical studies in *all* years of the curriculum. In the early years students acquire basic skills in the *identification* of community-health problems. In subsequent phases of the curriculum they are afforded opportunities to develop methods for *intervention* at a community level and to acquire experience by participating in public health programs.

- A Systems Approach to the Basic Sciences: The teaching of the basic sciences in the first year biology program and in the third through the fifth years is organized according to organ systems. In biology the focus is on *comparative study* of organ systems as a basis for the *organ system modules* in subsequent phases of the curriculum in which the teaching of appropriate disciplines is integrated within the framework of eleven organ systems. The second year is devoted primarily to introductory *disciplinary courses* in the basic medical sciences through which students acquire the vocabulary, concepts and methods of the individual disciplines in preparation for the later *interdisciplinary* organ system modules.

- Competency-based Clerkships: The clerkships are designed to facilitate the acquisition of a *specific set of competencies*. These competencies take into account student learning during the early clinical program and emphasize physician responsibilities throughout the successive phases of the *natural history of disease*. For this reason, *all* clerkships encompass learning experiences in medical care settings outside the walls of the hospital as well as instructional activities in the hospital wards.

- Emphasis on Primary Care: From the first year of the educational program the curriculum content, methods of teaching and settings selected for instruction reflect an emphasis on the *primary care dimension* of medical practice.

4. The Beersheva Curriculum

4.1. Issues and Responses in the curriculum development process

The curriculum in Beersheva has been designed to reflect the three major institutional goals. In the process of curriculum development, however, these were considered in the wider context of issues which confront medical education throughout the world today. Among the issues which have been of particular concern are:

1) the changing role of the physician and its educational implications

2) the effect of the information explosion on the curriculum

3) the issue of relevance in medical education

These issues have been considered in planning the program of studies in Beersheva. The manner in which they have been defined and addressed continues to exert a major impact on the structure of the curriculum and its content. Each issue will be discussed in terms of how it has been perceived, with particular reference to training of physicians in the United States, and the response which it has evoked in the Beersheva experience.

4.1.1. The Changing Role of the Physician

The role of the physician in society has not escaped the impact of social and technological change which characterizes the twentieth century. As epidemic diseases recede, chronic disabling conditions emerge as the major health problem. Adequate control often requires intervention by different categories of health professionals over long periods of time and involves considerations related to the quality of life as well as to its prolongation. Technological advances have made available methods of intervention which are more effective but which tend to fragmented, depersonalized and costlier. Public reaction, in turn, leads to pressure for change in the health care system which will counter these tendencies. This trend is evident both in the United States and in Israel.

In the course of such changes, the role of the physician may undergo modification. There is increasing emphasis on responsibility of the physician for integrating and assuring continuity of care through the various phases of illness and developing outreach programs to serve the needs of the population which are less effectively addressed within the confines of traditional medical care settings. Concomitantly, responsibility for certain tasks traditionally performed by physicians may be assumed by new categories of health personnel.

At issue in medical education is how to adapt the curriculum to the wide array of health-related activities in which graduates may participate. These range from delivering personal health services and conducting biomedical research to the operation of community health care programs. Individual schools have pragmatically tended to focus on preparing students for certain

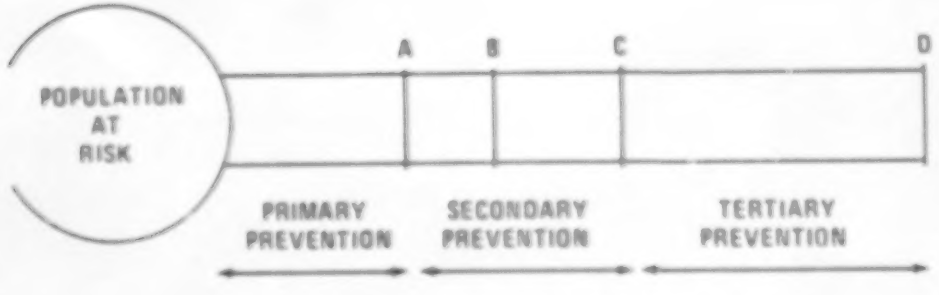
roles at the expense of others. Which roles are emphasized at a particular institution depend for the most part on local determinants such as geographic location, sources of funding, training facilities available and composition of the faculty. Medical Schools also differ in the extent to which they view their purpose as educating polyvalent graduates whose career decisions will be made at a later point as distinct from providing opportunities for students to make early career choices leading to differentiated courses of study at the undergraduate level.

The curriculum in Beersheva is designed to prepare physicians who can function effectively as either generalists or specialists in an integrated hospital-community system of health care. The distinguishing characteristic of this role is the responsibility it entails for participating in the *delivery of primary care* services. This is perceived as an essential component in the redefinition of the physician's role to which the school is committed.

For purposes of initial curriculum development, the role of the physician in primary care is taken to include 1) facilitating entry of the patient into the health care system, 2) providing preventive personal health care services, 3) integrating and assuring continuity of care through the various phases of illness, and 4) participating in outreach programs to serve the broader health needs of the population. Competencies required to meet responsibilities in each area have been identified and provide criteria for establishing and ordering educational objectives. Included are skills in fields not generally represented in Medical School curricula such as health education, management of health services and health care evaluation.

Following delineation of these competencies, a frame of reference for integrating knowledge, skills and attitudes related to primary care was developed. This was based on the *natural history of disease* concept. As used for curriculum planning in Beersheva, it refers to a temporal continuum in the evolution of disability resulting from the disease process. Points along the time axis can be identified at which intervention may 1) prevent the onset of the pathogenetic process, 2) reverse the pathogenetic process or decrease its rate of progression, and 3) reduce personal and social disability from the disease process. This approach is shown in Figure 1.

FIGURE 1



A: Biologic Onset
B: Possible Detection
C: Clinical Onset
D: Endpoint (cure, death)

It is postulated that learning medicine through a balanced study of all phases of the natural history of disease results in a more realistic perception of the physician's responsibilities in primary care than does the traditional focus on episodic periods of hospitalization. This perspective emphasizes the acquisition of competencies in disease prevention and patient rehabilitation as well as in the provision of acute care. It underscores the responsibilities of the physician for participating in community health programs in addition to providing personal health services. The natural history theme is not segregated in isolated segments of the curriculum, but forms part of the mainstream in all branches of study. It is reflected in the content of instruction, methods of teaching and settings in which learning takes place.

A significant segment of the clinical and public health experience during the first two years is organized according to the natural history of disease model. Students participate in activities related to primary and secondary prevention, acute care and rehabilitation in a wide range of health facilities. Concomitantly, they acquire the knowledge base in the basic sciences as related to successive stages in the natural history of disease. In the subsequent integrated organ system modules, each pathological condition is considered in terms of its natural history with appropriate emphasis on points at which primary or secondary prevention is feasible. The nature of the rehabilitative process receives special attention when it is this phase of the natural history which will require considerable physician intervention. The clerkships and field placements will be conducted at a wide range of health care facilities enabling students to acquire competencies which relate to each phase of the natural history of disease. The facilities include primary care clinics, hospital wards and outpatient services, rehabilitation facilities, public health settings and occupational health clinics. Judicious sequencing of these experiences encourages a perspective which emphasizes the intellectual challenge and opportunities for service associated with the primary care dimension of successive stages in the natural history of disease.

4.1.2. The Information Explosion in Medicine

A basic issue in medical education relates to the scope of the curriculum and the relative weight allocated to its various components. While the number of years reserved for undergraduate medical study has remained relatively constant, the rate at which new knowledge accumulates in the basic sciences and the clinical fields is increasing rapidly. The resulting pressures towards ever-increasing specialization gives rise to new demands for representation in a curriculum which is already limited by constraints of time. Often the problem is resolved arbitrarily. The outcome is determined by the particular constellation of faculty interests interacting with the power structure of the institution. A more rational approach involves setting criteria for deciding what to incorporate in the curriculum. There are both qualitative and quantitative dimensions to these decisions affecting the depth as well as the breadth of teaching in each facet of the program. Beyond these considerations of curriculum content there is a need to address the nature of the learning process itself as a means for preparing students to adapt to the constantly changing technological and social basis of medical practice.

The process of curriculum development in Beersheva requires that decisions

concerning each area of study be made according to explicit criteria. These are expressed in terms of *instructional objectives* which define the outcome of student learning in terms of *competencies* to be acquired. Specification of objectives constitutes the basis for delineating course content and allocating resources including curriculum time. Methods of teaching and evaluation are selected in relation to objectives. This approach tends to diminish the extent to which they are arbitrary.

Since the program of studies is designed to facilitate achievement of competency-based objectives, the way in which the latter are derived assumes considerable importance. The approach adopted in Beersheva is to base the competencies expected of students on those required by the practitioner. The framework for developing objectives is the *analysis of physician performance.*[1] The implications are far reaching. Priority is assigned to acquisition of knowledge and skills needed in the practice of medicine. In this context, the practice of medicine refers not only to those responsibilities which physicians assume within current modalities of health care delivery, but also those which can be projected into the future. Of no less concern than technical competencies, are the values which will guide students in applying knowledge and skills. These are equally amenable to performance analysis which can contribute to defining attitudinal objectives rooted in the reality of medical practice.

Competency-oriented objectives constitute the main thrust of Beersheva's response to the problems of sampling posed by the information explosion in medicine. Once professional competencies have been identified, they are ranked according to *priority* in the practice of medicine. Those considered essential are included in the core component of the curriculum. Students are expected to acquire a specified level of proficiency in the core competencies. Teachers are held accountable for achieving this outcome and curriculum time and other instructional resources are allocated accordingly. This approach is responsive to student needs as currently perceived. It does not, however, by itself prepare graduates who will be able to cope in the future with the rapidly changing scientific basis of medical practice.

Undergraduate medical education is but the first phase of a life long process of continuing education for the physician. Study habits and patterns of reasoning are important determinants of the future practitioner's ability to adapt to new circumstances and problems. Concern in Beersheva with these dimensions of the educational process has had several significant consequences. Developing capabilities for self-evaluation and self-education have been designated as objectives common to all portions of the curriculum. The evaluation system provides continuous opportunities for *self-assessment* by the student supported by resources for remedial intervention. Individual initiative is thereby encouraged and reliance on external sources of motivation minimized. In selecting methods of teaching, those fostering independent learning styles are emphasized.

Another related objective which transcends divisions within the curriculum is the development of *problem solving skills.* These involve application of the following sequence of procedures: 1) problem identification and formulation of objectives, 2) selection of modality of intervention from among possible alternatives, 3) implementation of the intervention selected, and 4) evaluation of outcome in terms of objectives and unplanned consequences.

While this approach is central to clinical studies, it also impinges on the teaching of basic sciences by shifting emphasis from the cultivation of recall skills to the development of independent and creative thinking. In all components of the curriculum, it provides criteria for sequencing the acquisition of competencies with those related to problem definition and setting of objectives preceding those concerned with methods of implementation.

4.1.3. Relevance in Medical Education

The widespread debate in recent years on the issue of relevance in medical education has challenged the traditional curriculum structure as inadequately responsive to the learning needs of students. Although at times more rhetorical than reflective this debate has stimulated reassessment of the educational process in undergraduate medical studies in terms of student perceptions as well as those of the administration and the faculty.

Relevance as it pertains to the applicability of what is learned in Medical School to subsequent professional practice has been discussed elsewhere in this report in relation to the information explosion in medicine and the changing role of the physician. The second context in which the question of relevance arises is the relationship among components of the curriculum and their sequencing. The main issue concerns the interval separating the acquisition of knowledge from its application under conditions simulating those of professional practice. In the traditional curriculum model, courses are taught in relative isolation and layers of basic studies are separated in time from layers of clinical application. While this strictly hierarchical approach may have logical merits, the manner in which it is perceived by students has significant motivational consequences and affects retention of knowledge and skills acquired.

The *spiral concept of curriculum* adopted in Beersheva is based on the premise that learning and retention occur more effectively when reinforced concurrently across diverse components of the curriculum and longitudinally over successive phases of the program of studies. Three principal curricular components are delineated: basic sciences, personal health care and public health. Instruction in each component begins in the first year and continues at successive levels of sophistication through the end of studies. From the outset, appropriate experience in clinical and public health settings is interwoven with acquisition of a knowledge base in the natural and medical sciences. Teaching is integrated both horizontally, among subject areas within a particular phase of the curriculum and vertically, among subject areas over successive phases. The approach towards integration in the curriculum is shown in Figure 1A. An example of this approach as applied to biochemistry is shown in Figure 1B.

The experiential analog of a spiral approach in the cognitive domain is the progressive assumption by students of independent responsibility for clinical care. Responsibility for clinical intervention begins in the first year, at which time it is limited in scope and exercised under direct supervision. It is anticipated that this early clinical experience will have a significant impact on student attitudes towards patient care. As the student progresses through successive stages of the curriculum, the scope is gradually enlarged and the degree of supervision diminishes. This is in contrast to the more traditional sharp demarcation between pre-clinical and clinical studies which

Figure 1A

Natural Science Discipline
(e.g., chemistry, physics)

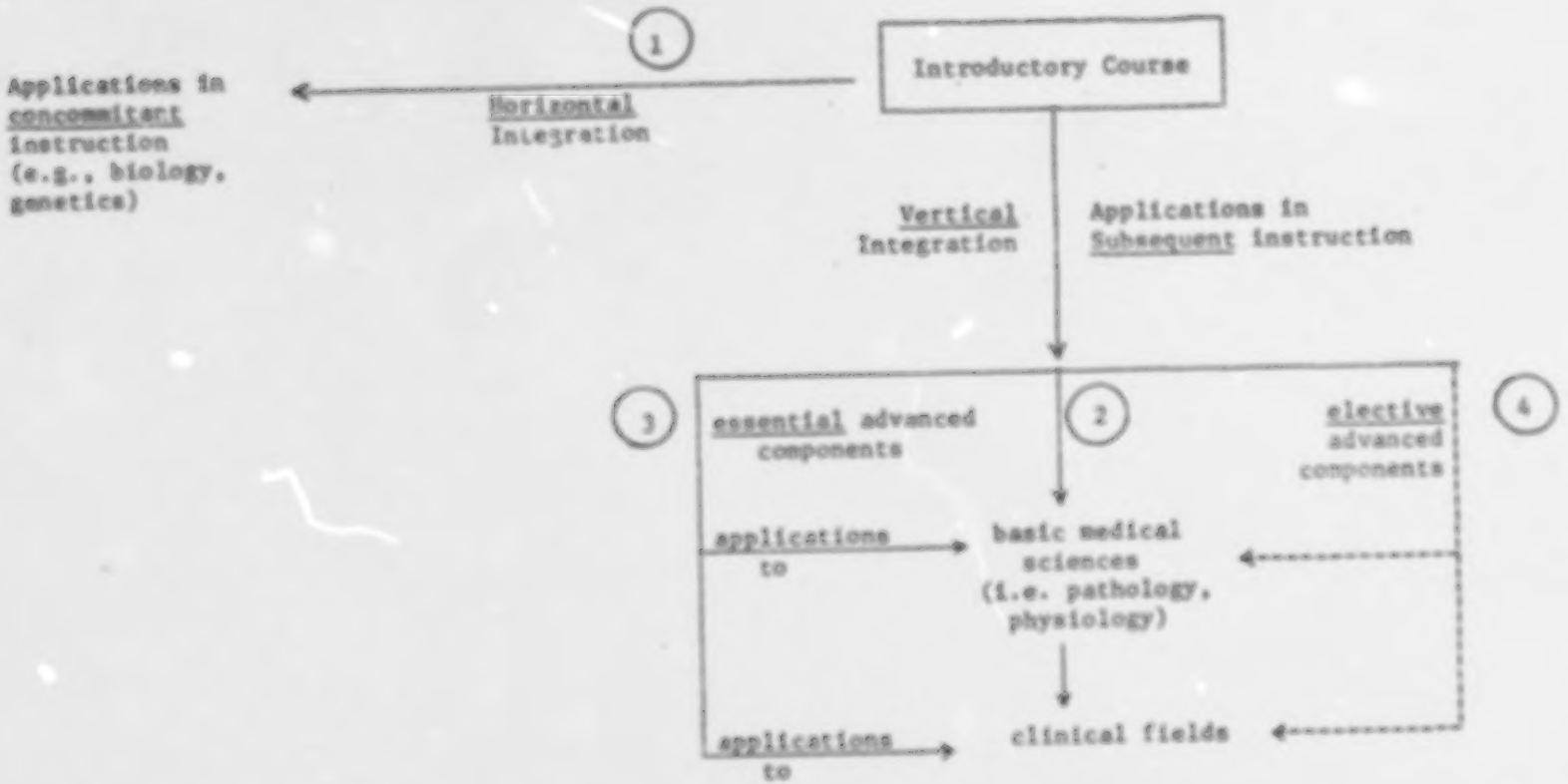


Figure 1B

subject area: biochemistry

sub area:

SUBSEQUENT STAGES — injection teaching

STAGE III (Semesters 6,7) — biochemistry of organ systems — *integrated organ systems modules*

STAGE II (Semesters 3,4,5) — biochemistry — *pathology (inflammation)*; *pharmacology*; *cell biology*; *the differentiated cell*

STAGE I (Semesters 1,2) — *organic chemistry*; *general chemistry*

VERTICAL INTEGRATION/COORDINATION

HORIZONTAL INTEGRATION/COORDINATION

leads to acquisition of independent responsibility by larger and at times overwhelming increments.

A spiral concept of the curriculum provides for learning through *successive approximations* over the entire six year program. This applies to all subject areas. Just as clinical studies commence in the first year and continue until graduation, so the basic sciences are not confined to the early portion of the curriculum. Both proceed in tandem, drawing on whatever fields of knowledge can contribute to the particular problem under consideration. This approach stresses ongoing utilization of knowledge from the basic sciences to solve problems simulating those encountered in professional practice. The complexity of problems and level of simulation increase progressively as students move through the several phases of the curriculum. The difference between the traditional and spiral approaches is shown in Figures 2 and 3.

The emphasis on problem-solving calls for considerable inter-disciplinary learning. It is postulated that this occurs optimally after students have acquired a basic foundation in each of the relevent disciplines. Implied is a sequencing pattern in which relatively short introductory courses in the various disciplines appropriate to each phase of the curriculum precede blocks of problem-centered inter-disciplinary teaching. These courses enable students to acquire essential vocabulary, basic concepts and principles as well as methodological tools of the respective disciplines before proceeding to their integration.

Sequencing of components of the curriculum is generally guided by the principle that the knowledge base underlying clinical or public health measures be acquired prior to experience in their application. At times, however, an approach more akin to the *discovery method* is used. Students are exposed to situations in which questions arise for which they have not been prepared in terms of theoretical background. The premise is that under circumstances in which questions arise out of personal experience, students will take initiative in seeking answers. Resources for this purpose, including formal instruction, informal access to teachers, and bibliographic facilities are made available. This approach, introduced early in the curriculum, seeks to channel experiential sources of student motivation into the development of patterns of independent study.

The clarity with which expectations related to academic performance are communicated to students is an important determinant of how they distribute their time and effort. Often considerable student effort is misdirected because of lack of understanding of what is expected. The process of curriculum development in Beersheva requires that units of instruction be prepared for each subject area, clinical clerkship or field assignment. These include explicit competency-based objectives.

For any given unit of instruction, the range of competencies which might be expected of students generally exceeds that which can be learned within existing time constraints. Each objective is therefore classified as *essential* or *elective* in terms of the extent to which it constitutes a pre-requisite for ultimate physician performance or for a subsequent component of the curriculum. All students are expected to meet the objectives classified as essential which serve as the basis for test items sampled in certifying examinations. Students

FIGURE 2

Approach in Layers

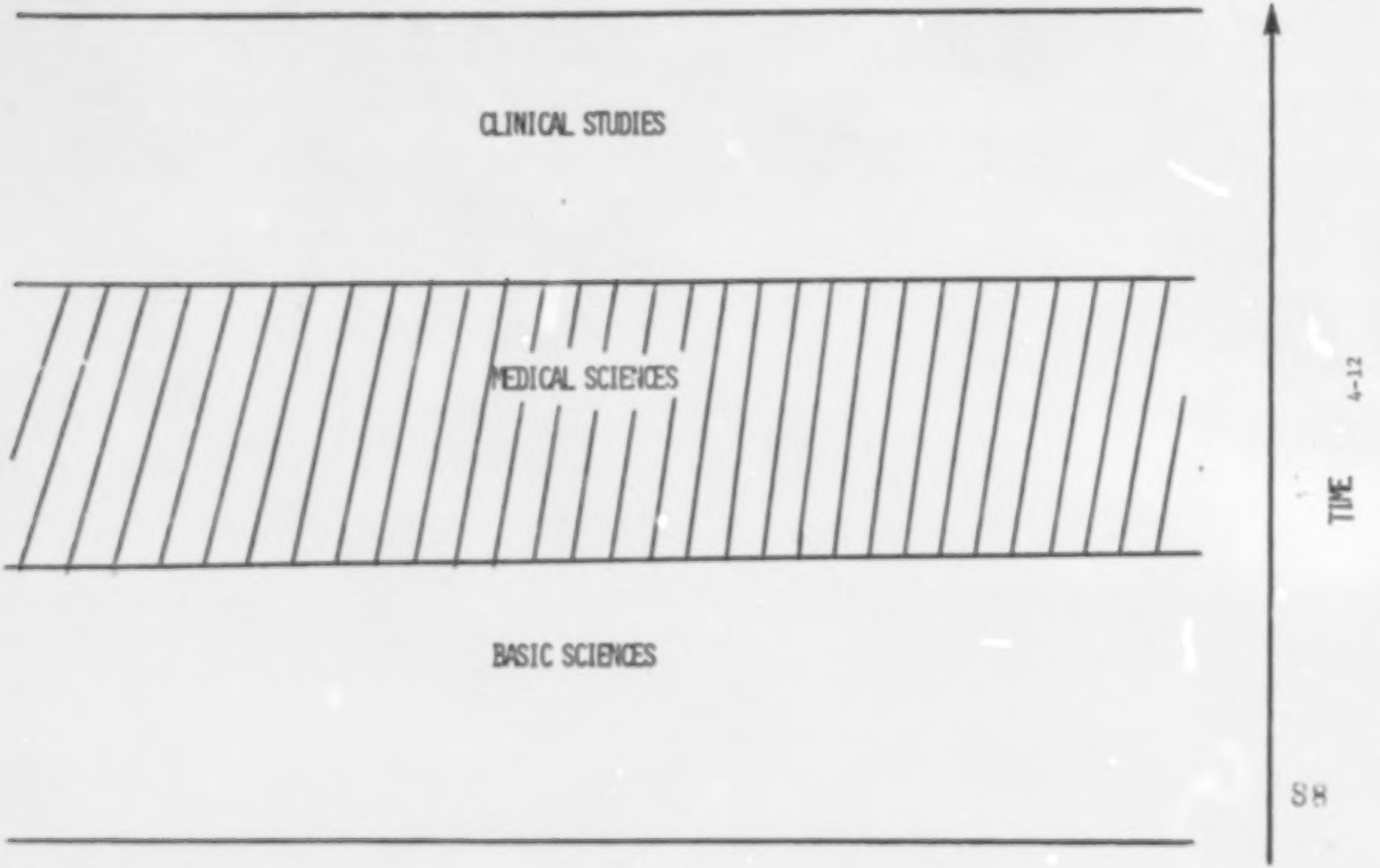
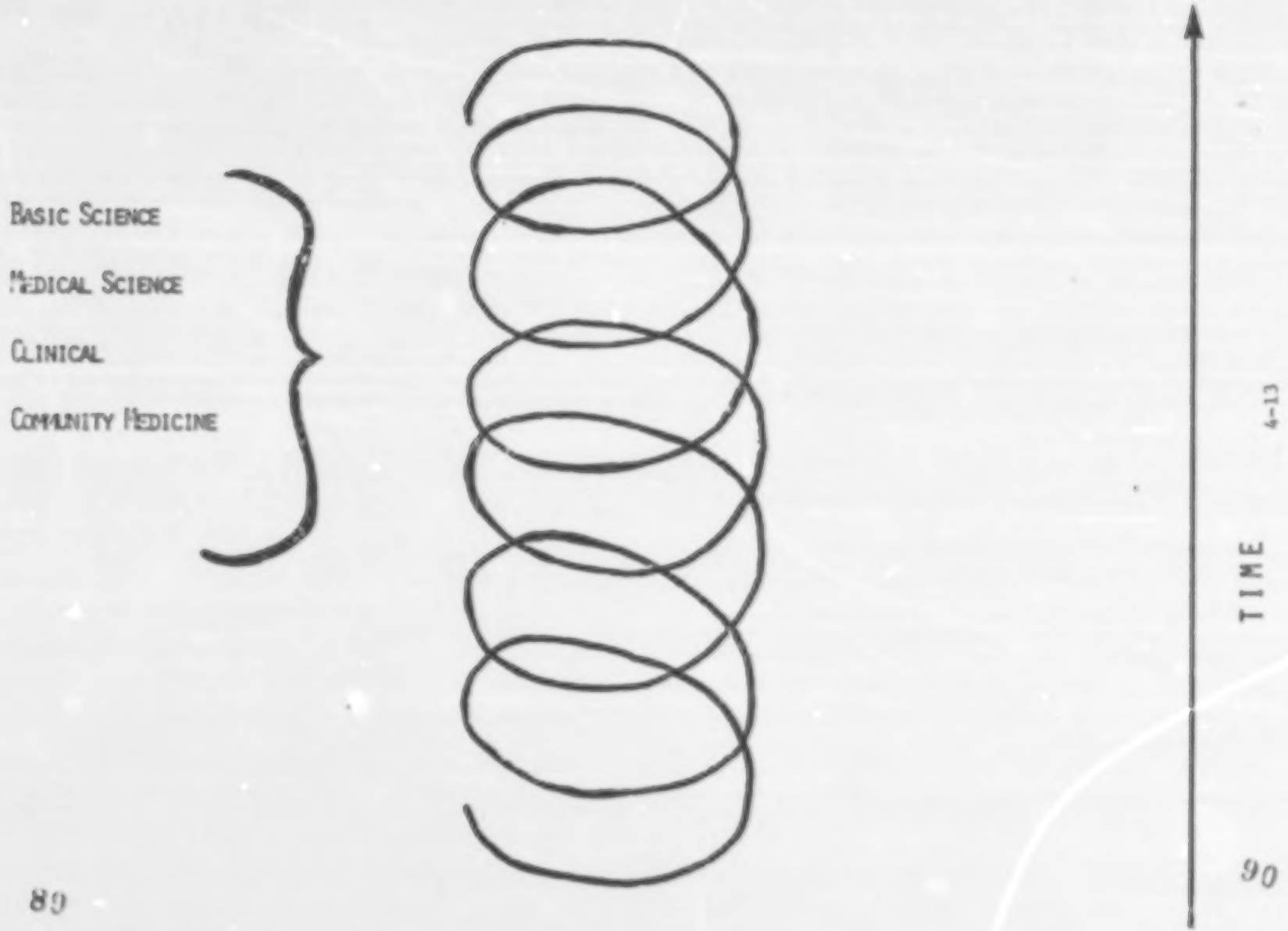


FIGURE 3

Spiral Approach



4-13

are free to address the elective objectives, which are provided for the purpose of guidance only, as a function of individual choice. These procedures are designed to communicate academic expectations in a manner which enables students to make rational decisions concerning allocation of learning effort.

It is recognized that these various measures to increase student perception of the curriculum as relevant to their learning needs are taken on a priori grounds. They require validation through examination of their consequences in actual practice. To this end, the evaluation system at the Medical School provides for collaborative review of each segment of the curriculum by students, teachers, and members of the curriculum development unit. The review is based both on learning outcomes as related to the specified objectives as measured by examination and analysis of the teaching process as perceived by both students and instructors. After each review, recommendation of steps which might be taken to improve instruction are formulated and serve as a basis for course revision.

4.2. The Beersheva Curriculum

4.2.1. An Overview[2]

The curriculum projection encompasses six and a half years of study divided into five phases. It seeks to translate the principles described in the previous section into a program of studies which will achieve the educational goals of the Medical School. Basic sciences, clinical medicine and public health constitute the three principal areas of teaching. Instruction in each area begins in the first year and continues through the end of studies. The structure, content and methods of evaluation are determined by competency based objectives. These more closely approximate physician performance with each succeeding phase of the curriculum. In addition to facilitating student acquisition of knowledge and skills, the curriculum is designed to fire intellectual curiosity, foster a humane approach towards the sick and encourage a sense of social responsibility which goes beyond the care of the individual patient.

Phase I which coincides with the first year of studies is shown in Figure 4. During this phase, students acquire a foundation in the physical, natural and social sciences. Concurrently, they begin clinical studies and learn basic skills in public health. In Phase II, shown in Figure 5, which comprises the second year of studies, the basic medical sciences are introduced and further clinical and public health competencies are acquired. Phase III, which is outlined in Figure 6, extends from the third through the fifth year of study. It consists of integrated organ system modules which alternate with clinical clerkships. Phase IV is a one year rotating internship required under the Israeli system of medical education. Phase V, the duration of which may be variable, offers students an opportunity to return to an academic setting for further elective work and study following completion of the internship.

Discussion of the first three phases of the curriculum which follows refers to its core component. Opportunities for elective study are provided from the first year of the program. Contingent on acquisition of the core competencies, students are encouraged to pursue further study in areas of individual interest, whether within the framework of the Medical School or in other faculties of the University.

FIGURE 4 - PHASE I

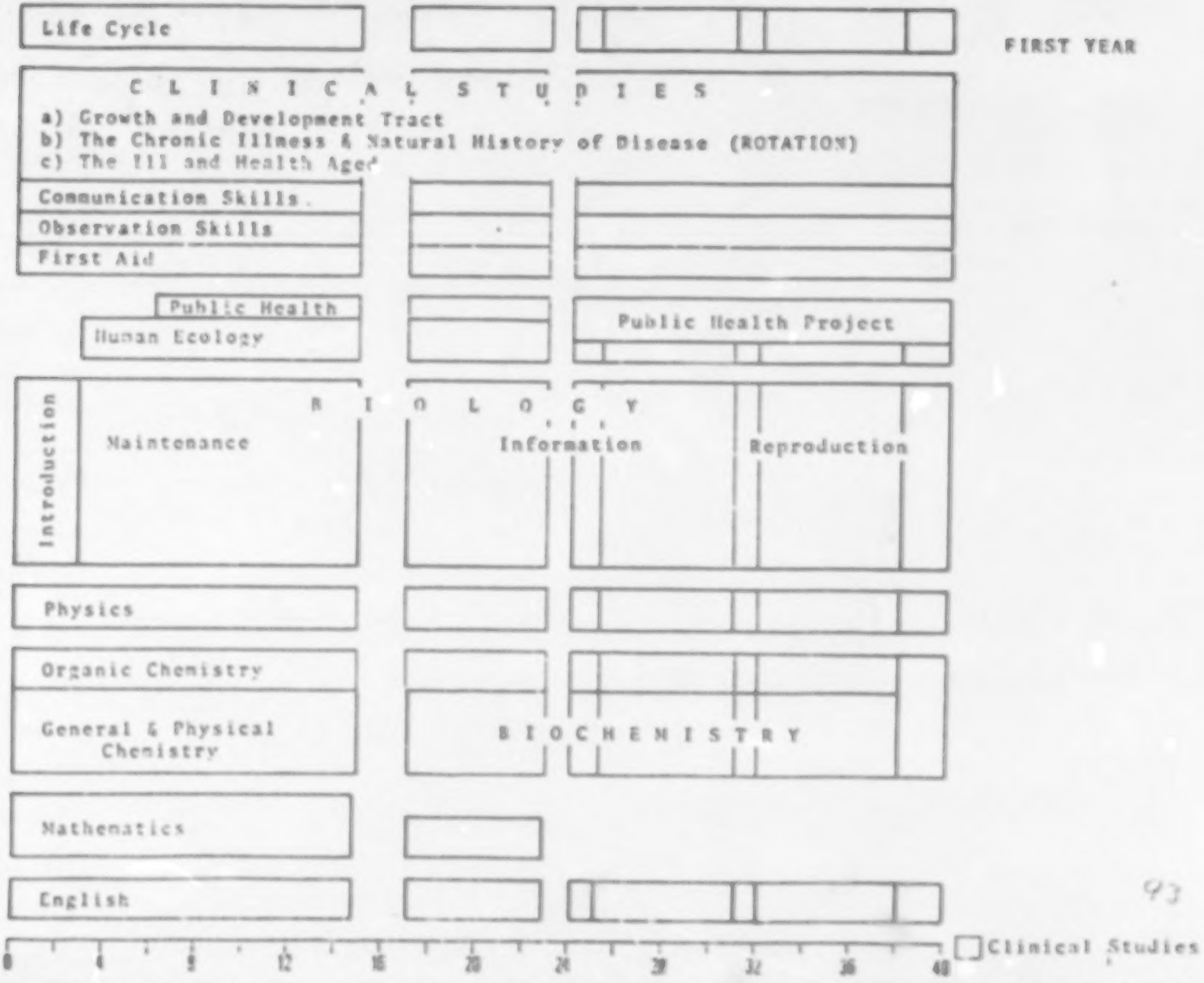


FIGURE 5 - PHASE II

SECOND YEAR

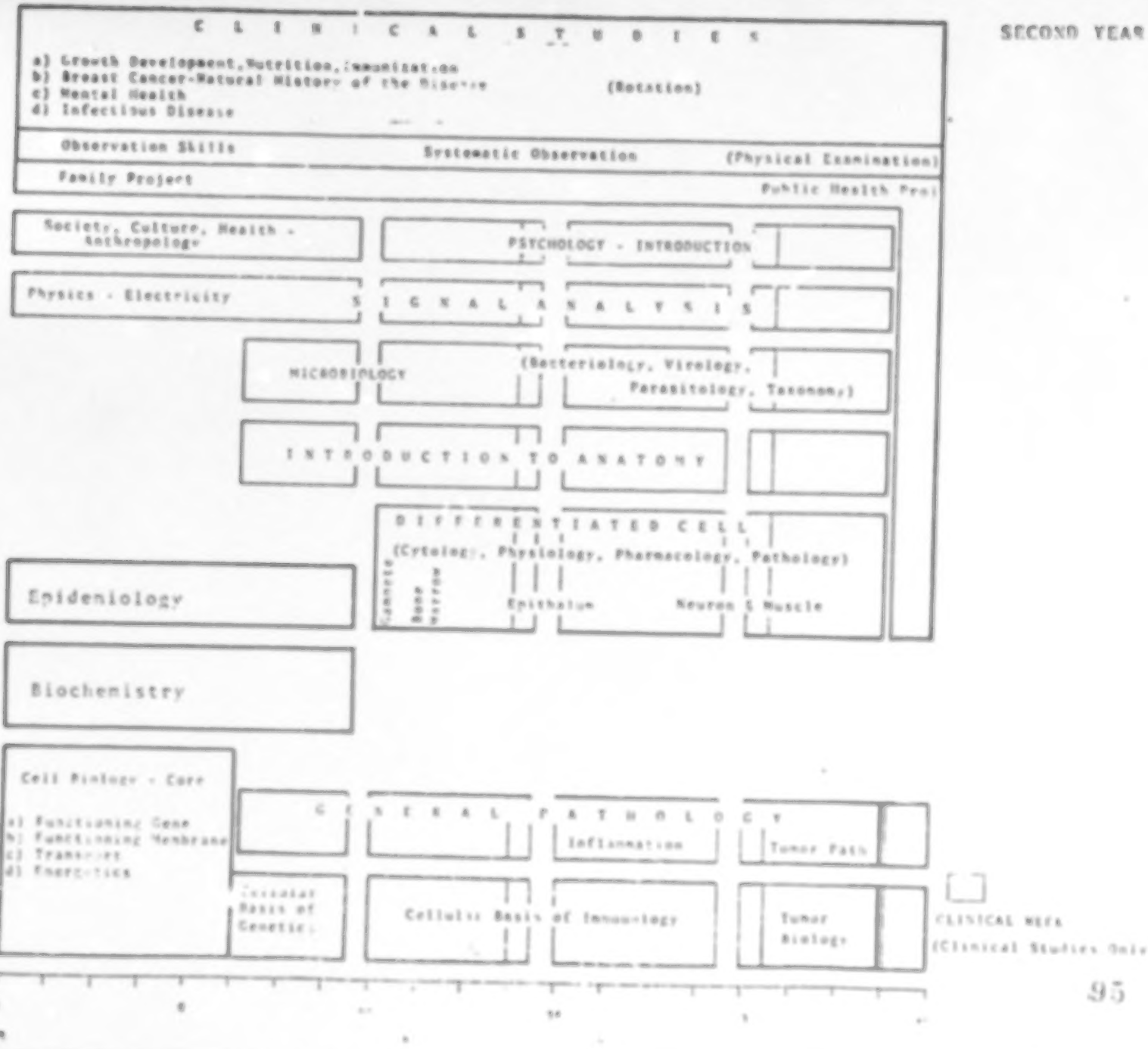
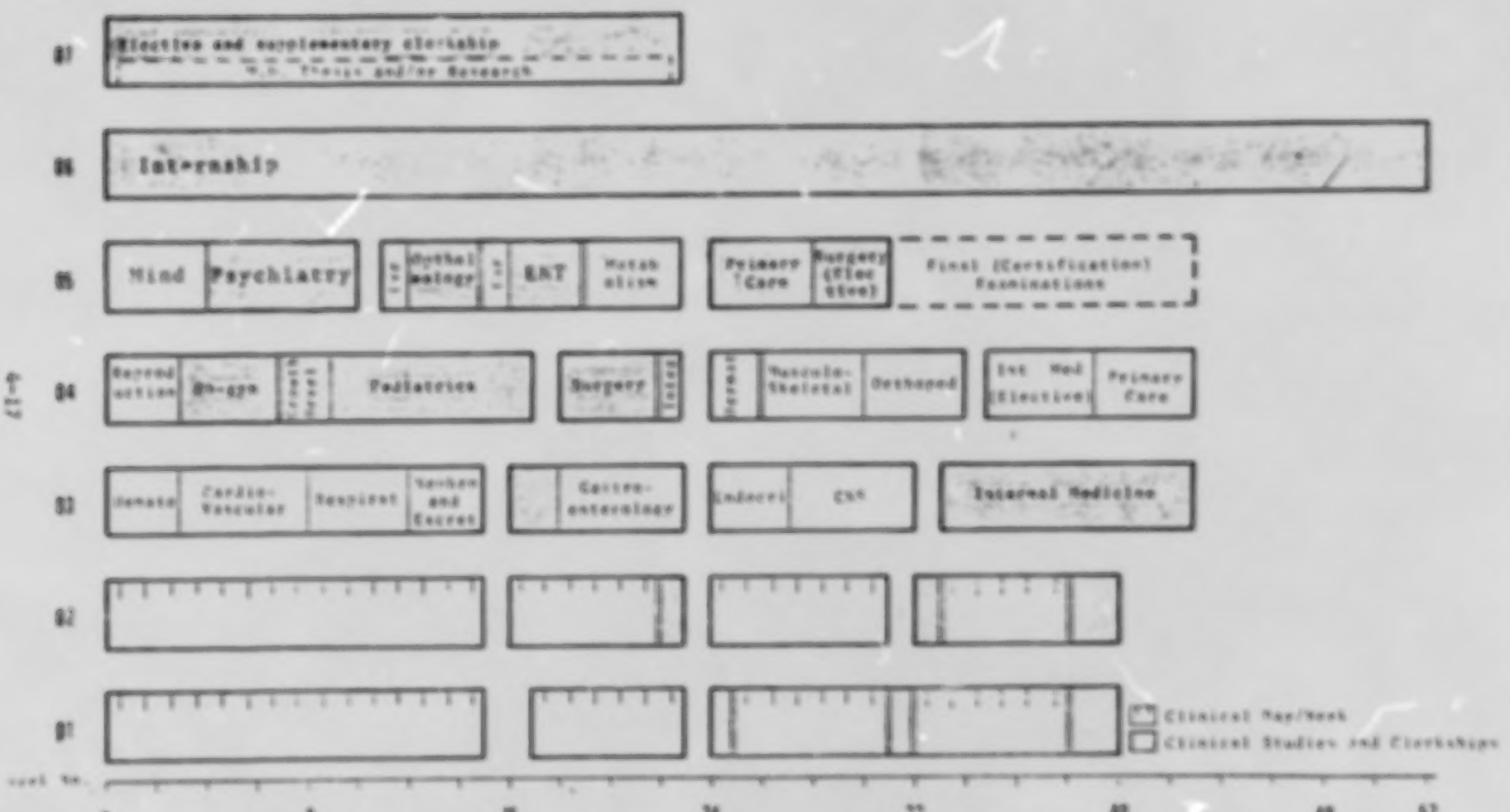

C L I N I C A L S T U D I E S
a) Growth Development, Nutrition, Immunization
b) Breast Cancer-Natural History of the Disease (Rotation)
c) Mental Health
d) Infectious Disease
Observation Skills
Systematic Observation
(Physical Examination)
Family Project
Public Health Proj
Society, Culture, Health - Anthropology
PSYCHOLOGY - INTRODUCTION
Physics - Electricity
S I G N A L A N A L Y S I S
MICROBIOLOGY
(Bacteriology, Virology, Parasitology, Taxonomy)
I N T R O D U C T I O N T O A N A T O M Y
D I F F E R E N T I A T E D C E L L
(Cytology, Physiology, Pharmacology, Pathology)
Epithelium
Neuron & Muscle
Epidemiology
Biochemistry
Cell Biology - Core
a) Functioning Gene
b) Functioning Membrane
c) Transport
d) Energetics
G E N E R A L P A T H O L O G Y
Inflammation
Tumor Path
Cellular Basis of Immunology
Tumor Biology
CLINICAL AREA
(Clinical Studies Only)

FIGURE 6 - PHASES III-V



4.2.2. Phase I[3]

The central focus of teaching in the *basic sciences* is the biology program. Emphasis is on human biology and ecology viewed within a wider biological perspective. The multiple solutions found in nature to problems of survival form a background against which the human solution is considered. The major course within the program is structured according to organ systems and is taught primarily at a phenomenological level, with stress on the observable phenomena rather than on detailed review of currently accepted explanations. Small group discussions and laboratory experiences encourage formulation of questions and the search for methods by which they can be answered. Appropriate segments of the courses in chemistry, physics and mathematics are either coordinated with or integrated into the framework of the biology program. Opportunities to apply knowledge and skills acquired in the biology program to problems related to medicine are provided in the clinical and public health components of the Phase I curriculum.

Courses in physics, general and organic chemistry, biochemistry, mathematics and the behavioral sciences complement the biology program in the area of basic sciences. These courses are limited in scope to those aspects of the respective disciplines which constitute prerequisites for the biology program as well as the clinical and public health portions of the Phase I curriculum. Prerequisites for later courses are generally provided subsequently in the form of "injection" teaching at the appropriate time and within an appropriate context.

Problem solving and critical reading of current literature are emphasized. Teaching methods include didactic presentations, small group discussions, demonstrations and laboratory exercises. Both the structure of formal teaching and the procedures for evaluation encourage the formation of independent study habits.

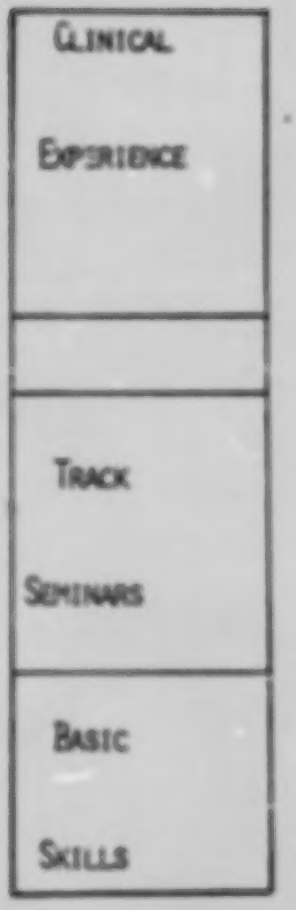
One full day each week and an additional block of one month is devoted to the *clinical program*. It is divided into two parts. There is formal course teaching in three areas of clinical competence: communication, observation and patient care. This is supplemented by several clinical tracks which enable students to practice the basic skills in a clinical setting (see Figure 7).

The *basic clinical competencies* taught at this stage of the curriculum require minimal theoretical background. Students can learn to relate to and communicate with patients and their families without as yet being concerned with the diagnostic or therapeutic context of the interview. In sharpening visual, auditory and tactile perception, they learn to discriminate more accurately among stimuli and to describe what they see, hear and feel in clear and succinct terms. An initial level of competency in selected facets of patient care such as first aid and basic nursing can also be acquired. Elementary skills in these three areas are taught through a combination of didactic sessions and practical exercises. They constitute the first approximation of history-taking, physical examination and patient management.

Three *clinical tracks* (see Figure 8) provide structured settings in which students may practice the general skills of communication, observation and patient care and at the same time acquire competencies specific to the

FIGURE 7

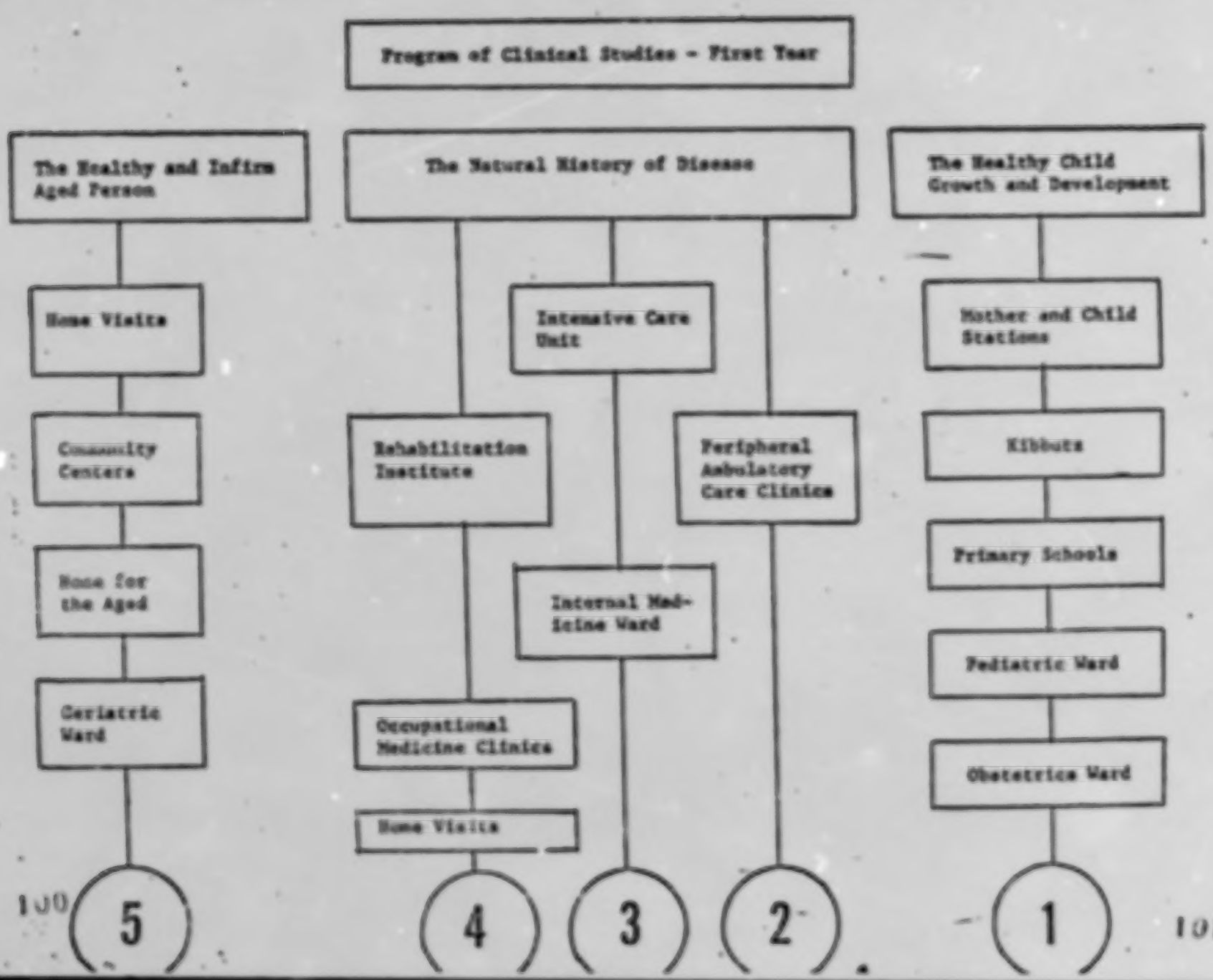
CLINICAL DAY



- PEDIATRIC
- GERIATRIC
- NATURAL HISTORY

- PEDIATRIC
- GERIATRIC
- NATURAL HISTORY

- COMMUNICATION
- OBSERVATION
- INTERVENTION


Program of Clinical Studies - First Year
The Healthy and Infirm Aged Person
The Natural History of Disease
The Healthy Child Growth and Development
Home Visits
Community Centers
Home for the Aged
Geriatric Ward
Intensive Care Unit
Rehabilitation Institute
Peripheral Ambulatory Care Clinics
Internal Medicine Ward
Occupational Medicine Clinics
Home Visits
Mother and Child Stations
Kibbutz
Primary Schools
Pediatric Ward
Obstetrics Ward
5
4
3
2
1

theme of each track. These are the healthy child in the community, the natural history of a chronic disease and the elderly person in health and illness. Objectives of the clinical experiences focus on the natural history of disease and the nature of primary care services.

The healthy child track encompasses normal pregnancy, delivery and growth and psychomotor development of the child up to the age of two. It is coordinated with the introductory course in the behavioral sciences and with parts of the biology program. Students study in groups of two to four at mother and child clinics, obstetrical wards, settings for primary pediatric care, day care centers and nursery schools. The teaching staff includes hospital and community based pediatricians, obstetricians, nurses, social workers and psychologists.

In the natural history of disease track, coronary heart disease is used as a model. Students participate in the delivery of health care at each stage in the progression of the illness from primary prevention to rehabilitation. Learning environments include urban and rural primary care clinics, the coronary care unit and internal medicine wards of the hospital, a center for the rehabilitation of cardiac patients and occupational health units in the region. Student experiences in this track are related to portions of the biology program and to the course in epidemiology. Participating in the teaching are primary care physicians, internists, epidemiologists, cardiologists, nurses, sociologists, rehabilitation specialists, social workers and occupational health physicians.

The geriatric track enables students to relate to the needs of the elderly in both health and disease. It is closely interwoven with teaching in the behavioral sciences and biology. Teaching takes place in community centers for the elderly, a home for the aged, community home care programs and the geriatric ward of the hospital. It is conducted by gerontologists, primary care physicians, nurses, physical and occupational therapists and social workers.[4]

The core of the *public health program* consists of epidemiologic projects conducted by students in the Negev region. The focus is on learning to apply survey methods for the identification of community health problems. Students, in small groups and under the guidance of faculty advisors, select a problem for investigation, develop a study design, collect and analyze data and draw inferences. Preparation for the projects begins with the ecology segment of the biology program. It continues with an introductory course in epidemiology during which students begin to formulate plans for the projects and acquire the necessary competencies in research methodology. It should be noted that students are introduced to independent research through its application to the solution of actual community health problems. The problems selected by students for investigation often reflect their experiences in the clinical portion of the curriculum. Faculty advisors include epidemiologists, biostatisticians, clinicians, public health physicians, nurses and sociologists. Projects are conducted at appropriate locations throughout the Negev region.[5]

Formative *evaluation* in each of the subject areas is through progress and post-tests. These are designed to help students identify learning problems and initiate steps for remedial intervention. At the end of the year, a summative examination is given which governs student entry into the second

phase of the curriculum. The principal instrument of evaluation is a written *integrative* examination. Several clinical vignettes provide the basis for a set of questions drawn from all subject areas taught in Phase I. A high proportion of the questions are at a problem-solving cognitive level. This examination takes the place of separate tests in individual subject areas and is designed to assess student ability to solve problems by drawing on those disciplines that are relevant. The vignettes approximate actual clinical problems at a level appropriate to the first year of studies. The integrative examination is supplemented by assessment of clinical competencies through observation of student performance in actual or simulated clinical settings and evaluation of the epidemiologic project.

4.2.3. Phase II[6]

Building on the earlier program in human biology, studies in Phase II in the *basic medical sciences* begin with a cluster of courses in cell biology. These encompass general molecular and cell biology, the cellular basis of genetics and immunology, and tumor biology. Teaching in these fields is integrated with certain aspects of biochemistry, physiology, cytology, and virology. The cell biology cluster provides the foundation for a second cluster which consists of introductory courses in the following basic medical disciplines: biochemistry, physiology, anatomy, histology, pathology, microbiology, and pharmacology. In addition, introductory courses in psychology, medical anthropology and epidemiology are offered. The introductory courses are concerned with fundamental vocabulary, concepts, principles and modes of thought which constitute prerequisites for the integrated study of organ systems which follows in Phase III. A second purpose is to provide a theoretical framework which enables students to progress to a higher level of sophistication in their concurrent clinical and public health studies. While the introductory courses generally follow disciplinary lines, there is considerable conjoint teaching in areas of overlap.[7]

As in Phase I, one day each week and an additional block of one month is devoted to the *clinical program*.[8] A course in systematic clinical observation is coordinated with the introduction to anatomy. Teaching of communication skills is extended to encompass communication with patients during multiple encounters. Opportunities to apply skills in emergency medicine acquired during the first year of studies are provided in the emergency room of the hospital.

There are four *clinical* tracks. The pediatric track focuses on competencies related to assessment of growth and development, nutrition and immunization and is correlated with the teaching in biochemistry, immunology and microbiology. Learning settings include pediatric wards, community mother and child clinics, immunization facilities of the Ministry of Health among the Bedouin population and specialized institutions for the care of children. Teachers include pediatricians, nurses, infectious disease epidemiologists, microbiologists and nutritionists.

The natural history of disease track follows the evolution of cancer of the breast through secondary prevention, surgery and rehabilitation. Students participate in the activities of screening teams as well as the surgical wards, out-patient clinics and follow-up facilities of the hospital. Elements of

the courses in tumor biology, pathology and epidemiology are coordinated with this track. Surgeons, pathologists, nurses, radiologists, epidemiologists and psychologists participate in the teaching.

A psychiatric track introduces students to the problems of mental health through experiences in a mental health clinic and a community-oriented psychiatric ward in a general hospital. Instruction in this track is integrated with introductory courses in psychology and medical anthropology. Teaching is conducted by psychiatrists, nurses, psychiatric social workers and psychologists. Infectious diseases in the community and the hospital is the theme of a fourth clinical track. Students apply knowledge acquired in the microbiology, epidemiology and immunology courses to the diagnosis and treatment of selected infectious diseases which are prevalent in the region. Instruction in health centers and hospital wards is provided by clinicians, microbiologists, epidemiologists and pharmacologists.

The various clinical tracks reinforce a perspective based on the natural history of disease and emphasize the primary care dimension of physician practice while affording opportunities for the application of skills in observation, communication and intervention. By the end of the second year, students have participated in the delivery of medical services in all types of health care settings in the Negev region and have acquired a set of basic clinical competencies which in Phase III will provide the foundation for medical history-taking, physical diagnosis and patient management.

In the *public health program* students continue their epidemiologic projects. Concurrently, a course in public health practice concerned with the selection and evaluation of modalities for intervention at a community level is offered. Student experience in the various types of settings for the delivery of preventive and curative health services provides a frame of reference for this course. In Phase III they will utilize the competencies acquired to assume limited responsibilities in community health care programs.

The *evaluation* procedures, while similar to those in Phase I, more closely approximate the conditions of actual physician performance. The written certifying examination at the end of the year integrates around a series of clinical vignettes questions drawn from all of the disciplines studied during this phase. Assessment of clinical competencies is cumulative, based on student learning during the first two years. Successful performance on these examinations indicates student readiness to begin study of the integrated organ system modules and enter the clinical clerkships which comprise the next phase of the curriculum.

4.2.4. Phase III

The duration of the third phase of the curriculum is approximately three years. It is comprised of two major components. A series of *integrated organ system modules*, divided into clusters, alternate with *clinical clerkships* in related fields. This pattern of sequencing is designed to reduce the interval between the acquisition of knowledge and its application and to continue the approximation of ultimate physician performance at successive levels of simulation. The following description is based on one year of experience in implementing this portion of the curriculum and on the projection for future years.

The various disciplines which were introduced in Phase II are now applied within the context of individual organ systems. Considerations of basic physiopathological processes leads to an understanding of the clinical manifestations of representative conditions. Each is viewed in terms of its natural history and the points at which different modalities of intervention may be effective. The relative emphasis on preventive, curative and rehabilitative medicine varies with the characteristics of the condition under consideration and determines the constellation of disciplines involved in teaching.

With increasing background in the basic medical sciences comes the acquisition of new technical and interpersonal skills. Competencies in clinical data collection through history-taking, physical examination and ancillary techniques augment the more general skills in communication and observation learned earlier. A new dimension of competency introduced at this point is that of differential diagnosis and clinical judgment. Increased capabilities are acquired in comprehensive patient management in preparation for the increment in responsibility for patient care which students will assume during the clinical clerkships.

A *problem oriented* case method of teaching complements the systematic approach to organ systems. Cases are selected to help elucidate particular physio-pathological mechanisms, underscore important diagnostic and therapeutic considerations, provide insight into the psycho-social dimensions of illness and evoke the public health implications of specific conditions. Cases are drawn from all stages of the natural history of disease and reflect issues which arise in hospital wards, outpatient clinics and primary care settings. The cases are generally presented by students with instructors from the relevant basic sciences, clinical fields and public health disciplines taking part in the discussion.

The problem of *integration across systems* is addressed in several ways. Firstly, the modules are cumulative. Each incorporates appropriate elements related to organ systems which have been studied earlier. Secondly, the teaching of certain disciplines such as anatomy may combine several organ systems when this appears to be a more reasonable approach. Thirdly, several methodological courses given in parallel with the modules provide a framework which is less organ system oriented. These include courses in physicial diagnosis, clinical reasoning and evaluation of medical care. Fourthly, towards the end of Phase III, an inter-systems module is offered which encompasses conditions characteristically involving multiple organ systems.

The *clinical clerkships* which range from several weeks to several months provide a change of emphasis in the pattern of learning. By the time students enter their first clinical clerkship, they have acquired, in addition to substantial theoretical background, the equivalent of approximately one academic year of experience in clinical settings. The clerkships in wards, clinics and health centers, therefore, do not entail acculturation to a new milieu or the acquisition of routine skills needed to function in a health care facility. This has been achieved in small increments since the first week of medical studies. It is postulated that under these circumstances the rate at which students can learn in a clinical environment and the level of responsibility which they are competent to assume are higher than would be the case had a more traditional curriculum been adopted.

The clerkships, then, represent the next level at which student performance approximates that of the practicing physician. Emphasis is on *progressive assumption of responsibility* for patient care under guidance. Practical experience with feedback from instructors, tutorials, small group seminars and considerable independent study constitute the primary modalities of learning. Like other parts of the curriculum, the objectives of the clerkships are competency-based. This implies that the learning experiences are carefully designed to facilitate attainment of specific competencies rather than to occupy students during a designated period of time. As in the case of the organ system modules, priorities among competencies are determined by the broad educational goals of the Medical School.

Like the clinical tracks in Phases I and II, the clerkships are not exclusively hospital-based. They may involve a number of health care settings. Thus, the clerkship in medicine, in addition to hospital-based activities, may involve follow-up of patients after discharge in outpatient clinics, community primary care facilities and settings in which public health services are delivered. Similarly, the clerkship in primary care, while based at a community health center, may require students to follow patients during the period of their hospitalization as well as during the course of their contact with other health agencies. During any clerkship, students may participate in community programs for the solution of public health problems. The efficacy of this approach to teaching continuity of care will depend, in large measure, on the degree to which the Medical School is successful in bringing about an integrated hospital-community system of health services in the Negev.

Integrated organ system modules alternate with clerkships until the end of Phase III. An initial cluster of modules based on the theme of homeostatic maintenance includes the hematological, cardiovascular, respiratory, gastrointestinal, renal, endocrine and nervous systems. This is followed by the clerkships in medicine and pediatrics. Clerkships in obstetrics/gynecology, surgery and orthopedics are preceded by modules in the reproductive and musculo-skeletal systems. The first of two clerkships in primary care follows. The remaining modules in mind, integument and the special senses are linked with clerkships in psychiatry, dermatology, opthalmology, and otorhiolaryngology. Phase III ends with a second round of clerkships in medicine, primary care and surgery and a summative inter-system module.

Evaluation of learning in the integrated organ system modules follows the pattern used in earlier phases of the curriculum. A pre-test is administered prior to each module. Intermediary tests, generally self-administered, provide feedback to students in the different segments of the module and indicate needs for remedial intervention. A summative examination at the end of each module identifies residual deficiencies.

Evaluation in the clinical clerkship begins with a pre-test developed by the instructors responsible for the clerkship. This measures essential entry-level competencies and is criterion referenced. A student whose performance on the pre-test is inadequate may be required either to demonstrate acquisition of the missing competencies shortly after the clerkship begins, or, in the event that the problems are more extensive, to postpone starting the clerkship until they have been overcome. In certain instances, the clerkship prerequisite test may be merged with the summative examination at the end of a cluster of modules. *Continuous monitoring* of student progress throughout the clerkship is planned rather than limiting evaluation to a

single episode at the end of the period. This will be characterized by ongoing observations by instructors and opportunities for students to demonstrate mastery of competencies as acquired.

At the end of Phase III, a *final certifying examination* will be administered. The purpose of this examination is to determine the extent to which students have achieved the goals of undergraduate medical education as defined within the Beersheva context. The last turn of the curriculum spiral has been reached and the evaluation is conducted under conditions which approximate closely those which the emerging practitioner will face during the year of internship which follows.

4.2.5. Phases IV and V

Phase IV is projected as a one year rotating internship. This is currently a legal requirement in the Israeli system of medical education. Students may elect to take the internship at any hospital in the country which is recognized for this purpose. It is anticipated that the internship program in Beersheva will reflect the goals and principles which shape the preceding three phases of medical studies.

As currently envisioned, an opportunity will be afforded students to return to the Medical School setting for variable periods of time following completion of the internship. It is postulated that on the basis of the internship experience students may wish to pursue further study or research in an area of clinical medicine, basic science or public health. Facilities for these purposes will be provided in Phase V, the full scope of which remains to be delineated.

REFERENCES

1) An analysis of physician performance was prepared by Dr. D. Benor, Director, Planning and Evaluation Section, Curriculum Development Unit. It appeared as Appendix H of the Report covering the third quarter of year 01, submitted April 1, 1975.

2) See Interim Report I; page 5-9

3) See Interim Report I; page 5-13
   Interim Report II; page 79

4) See Interim Report I; page 5-83
   Interim Report II; page 121

5) See Interim Report I; page 5-217
   Interim Report II; page 110

6) See Interim Report I; page 6-1
   Interim Report II; page 134

7) See Interim Report I; pages 6-6 to 6-25
   Interim Report II; pages 135 to 176

8) See Interim Report I; page 6-30
   Interim Report II; pages 199-267

5. The Faculty Teaching Laboratory

The development of faculty teaching competencies represents a principle objective of the current contract. To this end, a Faculty Teaching Laboratory was established by the Curriculum Development Unit with guidance from staff of the Center for Educational Development in Health. The first step involved recruitment of faculty. This was followed by establishment of the Faculty Teaching Laboratory. These steps are described in Section 5 of this report. The basic workshop in educational methods is described in Appendix II.

The Faculty Teaching Laboratory encompassed a number of faculty development activities designed to prepare members of the faculty to participate in the development, implementation and evaluation of an innovative curriculum as described in Section 4 of this report.

1) Activities of the Faculty Teaching Laboratory

- Teacher Training Workshops. A total of 12 workshops in *basic educational methods*, based on the CEDH model for systematic course design, were offered from July, 1974 through June, 1977. Approximately 145 members of the faculty participated in the workshops. A series of 14 *second level workshops* in a) developing units of instruction, b) teaching communication skills, c) developing evaluation instruments and d) teaching clinical skills were organized with the participation of 45 teachers.

- Inservice Training. Due to external constraints many teachers were *unable to participate in the formal workshops*. To overcome this difficulty, inservice training to individual teachers and subject area committees was provided during the process of course preparation. This teacher training activity was initiated in 1974, continued through 1977 and involved the preparation of approximately 84 courses.

- Development of Units of Instruction. The development of Units of Instruction was one of the most important activities of the Faculty Teaching Laboratory. Units of instruction were prepared for 85% of the courses. They serve to clearly *define the content*, boundaries and depth of teaching in each subject area and to *specify the competencies* expected of students at successive stages of the curriculum. The units of instruction are used to *integrate* different components of the program of studies, to *provide guidance* for student independent learning, to provide *criteria for selection of appropriate teaching methods* and to constitute the basic unit of a criterion-based *evaluation* system.

- Learning Packages in Educational Methods. To supplement the formal workshops and inservice consultation learning packages in educational methods are being developed. These are *self instructional materials* on various teaching methods used in Beersheva. They are designed to foster self-learning by members of the faculty and thus help to

overcome the constraints on participation in group paced workshops. The themes of the packages are similar to those of the basic workshop.

- Learning Resources Center. The Learning Resources Center provides a responsive environment wherein students and teachers have an opportunity to explore approaches to learning beyond those of the formally scheduled classes. This facility was used by teachers to *experiment* with innovative methods of teaching.

2) Impact of the Faculty Teaching Laboratory

- It constituted tangible evidence of the *commitment* of the Medical Schools to the approach towards teaching which had been "proclaimed" at the time of its founding.
- It helped create a *community* of teachers who identified with each other and with the goals of the school.
- It helped the individual teacher to develop an image which reflected, in addition to his own primary professional role such clinician, researcher or administrator, that of an *educator* - with the sources of satisfaction and sense of responsibility which this implies.
- It gave teachers the *tools* to do what was expected of them, thus enabling them to translate good intentions into concrete actions.
- It provides a mechanism for *feedback* to the Curriculum Unit which enabled the unit to identify new training needs as they arose and to be responsible to the perceived needs of the teachers.

3) Methods of Evaluation the Faculty Teaching Laboratory

- Feedback from Faculty. Following each activity of the Faculty Teaching Laboratory feedback was obtained from participating faculty members concerning the strengths and weaknesses of the activity and recommendations for improvement.
- Debriefing Sessions. During debriefing sessions held when each course is completed student evaluation of the instructional process is obtained which together with results of evaluation of student performance in the subject area provide information concerning the effectiveness of the teacher training activities.
- Student Questionnaires. Each student completes a questionnaire at the end of every course. The data thus obtained provide an additional source of information concerning teacher effectiveness.

5. The Faculty Teaching Laboratory

5.1 Background of Faculty Development Activities

At the outset of the contract, first priority was given to recruitment of teachers for the preparatory sessions and the initial stage of medical studies.[1] The pool of potential teachers consisted of:

a. members of the various faculties of the Ben Gurion University
b. staff of the Soroka Hospital in Beersheva
c. staff of the health facilities in the Negev maintained by the Ministry of Health.
d. staff of the Kupat Cholim outpatient clinics in the Negev
e. health professionals from institutions in other parts of the country who might be willing to teach on a part-time basis in Beersheva

The process of recruiting was therefore guided by the following considerations:

1) Participation in development of the educational program should be open to the widest number of potential teachers in the Negev. It was clearly neither realistic nor desirable to limit participation to the relatively few hospital physicians who had already received appointments in the medical faculty. On the contrary, it appeared highly desirable to seek the involvement of all individuals with the capacity to make a contribution to the planning or implementation phases -- irrespective of institutional affiliation.

2) Initial curriculum building activities should be firmly based in Beersheva among residents of the Negev. The temptation existed to recruit highly competent teachers from other parts of the country who would assume major educational responsibilities "assisted" by local academicians and clinicians. Such an approach, while attractive in terms of achieving visible results over the short term was judged to be unacceptable since it would have run the risk of deepening and perpetuating the feeling of alienation on the part of physicians and scientists in the Negev. The guideline adopted was therefore to limit *initial* recruitment to persons resident in the Negev. It was reasoned that once local health professionals would identify with the new Medical School through close involvement in the initial phases of curriculum development it would be appropriate to supplement their capabilities through recruitment from outside the region. This policy was followed from 1974 through 1977.

The recruitment and orientation procedure consisted of inviting interested persons to participate in discussion groups to consider the philosophy underlying the establishment of the Medical School and to formulate broad curricular options consistent with the institutional goals. During this phase, a maximum number of interested persons with

appropriate background was identified and invited to participate. The groups were organized according to discipline, academic area or professional background. Discussions focused on how teaching in the particular discipline or subject area could contribute to attainment of the educational objectives of the school. It was thought that homogeneity of background among members of the various discussion or "reference" groups would:

(1) help create an atmosphere in which the "different" mission of the Medical School would be perceived as less threatening

(2) attract by word of mouth additional potential teachers from the same professional background

(3) facilitate the identification among a group of individuals with the same professional background, those who had appropriate competencies, outlook and motivation for continued association with the process of curriculum development

(4) provide a setting in which concrete guidelines could be formulated with respect to curriculum in specific subject areas for the first year of medical studies

The following constraints were encountered in the recruitment process:

1. No financial incentive could be offered in years 01 and 02 to anyone participating in the educational program of the Medical School. The contract between Kupat Cholim, the Ministry of Health and the government had not as yet been negotiated. This meant that no clinician could expect remuneration for his teaching efforts in the months to come, whether or not he had a nominal academic appointment. The same situation prevailed within Ben Gurion University. No arrangement had been made for remuneration of members of other faculties who would be teaching in the Medical School. This meant that participation was, at this point, on a voluntary basis. Given the relative economic difficulties which physicians and scientists face in the Negev, this constraint resulted in a type of self-selection whose effect is difficult to assess. This situation slowly improved and by 1976 the constraint no longer existed.

2. A minority of the potential teachers did not share the philosophical outlook which was being proposed and were thus less than enthusiastic about the future prospects of the Medical School. To such individuals, particularly among the senior physicians and scientists, their status was derived from past achievements and was not contingent on their acceptance of the "new-fangled" view of medical education which was being brought "from the outside". A "wait and see" attitude on the part of such individuals was prevalent.

3) There was an undercurrent of resentment among other faculties in the Ben Gurion University towards the burgeoning Medical School which was viewed as acquiring more than its fair share of the resources available to the University. This attitude was evident in several departments which displayed a certain coolness in their response to requests from the Medical School for assistance in the teaching program.

The unavoidable fact is that Beersheva is not a major medical or scientific center in Israel. This implies a relative paucity in the number of competent, well-trained physicians and scientists at risk to participate in the development of the Medical School. This is independent of the other constraints described above. The availability of visiting consultants was of considerable help in overcoming some, but certainly not all, of the problems related to this issue.

Despite these constraints the initial efforts at recruiting and faculty development were sufficiently successful to provide the manpower necessary to begin curriculum development for the first year of medical studies. It should be observed that those who did decide to throw in their lot with the new venture were, in general, enthusiastic, open-minded and prepared to invest considerable effort on a voluntary basis.

In recruiting, a deliberate emphasis was placed on identifying and attracting the younger members of the medical and academic communities. Concomitantly an effort was made to avoid alienation of the more senior staff. Validation of this approach will have to await the passage of considerably more time than has elapsed thus far. In the short term, this has accentuated the problem of absences due to military reserve service, but has yielded a core of devoted teachers whose view of the Health Sciences Center is oriented towards the solution of problems of the future and who, as will be described in subsequent sections of this report, have been receptive to the challenge which the Medical School is posing to established concepts of medical education and the delivery of medical care.

With the recruitment of teachers for the second, third and fourth years of medical studies, several new problems became evident. In many of the subject areas to be taught, no teachers were available in the Negev region. These subjects included basic medical sciences such as anatomy, physiology, histology and pathology, as well as certain clinical fields. There was no alternative but to seek part-time teachers from other Medical Schools in Israel and concomitantly to intensify efforts to recruit full-time faculty. Among the problems posed by this step were:

(1) Available visiting faculty do not necessarily share the educational philosophy of the Ben Gurion University of the Negev Medical School. This can lead to a "dilution" of the approach which characterizes the Beersheva venture and ultimately can alter the educational climate in the direction of that which prevails in the visiting teachers' home institutions.

(2) Despite goodwill, visiting faculty are unlikely to devote the time and effort which is necessary to produce the integrated type of curriculum which characterizes the first year program of medical studies.

Years 02 and 03 of the contract were characterized by a slight improvement in the recruitment situation. As the viability of the Medical School gained in credibility, there was evidence of increased interest on the part of potential teachers in the Negev region in participating in the educational program. The Faculty Teaching Laboratory served as a recruitment mechanism as well as a setting in which teachers already on the staff could increase their instructional capabilities.

5.2 Faculty Development Activities[2]

Under the leadership and guidance of the Unit for Curriculum Development, a number of faculty development activities were instituted within the framework of a Faculty Teaching Laboratory. There was widespread interest among teachers in participating in teacher training activities. This interest appears to stem from 1) a lack of confidence in teaching abilities associated with a lack of teaching experience among a high level of motivation as well as a relatively high degree of flexibility. Teachers were less committed to traditional methods and willing to try out new approaches; 2) a "status" factor associated with participation in a teacher training workshop. Graduates of workshops enjoyed the respect of colleagues and were looked to by others in educational matters. These conditions still exist at the end of year 03 and provide a favorable climate for the operation of a Faculty Teaching Laboratory.

A sense of commitment and involvement among the faculty is a necessary, but insufficient condition for successful introduction of innovation into the curriculum. These must be complemented by the *ability* to apply new skills to the design and implementation of instruction. In its absence there is little probability that the rhetoric of curriculum change will result in educationally valid programs. Enthusiasm can not substitute for competency and teachers who do not have these skills cannot be expected to apply them.

5.2.1 Teacher Training Workshops

The first step in teacher training was taken in June 1974 when a two-week workshop in educational methods was offered, under the direction of Dr. J. Guilbert of the Health Manpower Development Section, World Health Organization, Jerusalem, to prospective teachers in the Medical School. A total of twenty-four persons participated in the workshop, including physicians from Soroka Hospital and the Kupat Cholim Clinics as well as scientists from the Faculty of Natural Sciences of Ben Gurion University. Dr. Guilbert was assisted by Dr. Carmi Margolis, who was formerly associated with the Office of Medical Education Research and Development at the College of Human Medicine, Michigan State University and Dr. Malcolm Skolnik, Director of Biomedical Communications at the University of Texas Medical School of Houston.

The outcome of this workshop was very favorable in terms of its impact on the participants. They acquired basic concepts in educational planning, and although self-selected to start with, they were even more highly motivated upon termination of the course. In a retrospect of almost three years, sixteen out of the twenty-four participants have played significant roles in the process of developing curriculum for the first year of medical studies. In the light of the successful outcome, it was decided to hold similar workshops from time to time as part of the Faculty Teaching Laboratory to be operated by the Unit for Curriculum Development. From 1974 through 1977 a total of 12 introductory workshops were held with the participation of approximately 145 members of the teaching staff.

In years 02 and 03 the basic workshop in educational methodology was supplemented by second level courses in the following areas:

Development of units of instruction	6 workshops
Teaching communication skills	3 workshops
Developing evaluation instruments	3 workshops
Teaching clinical skills	2 workshops

These workshops were open to teachers who had already participated in the basic workshop. Approximately 45 teachers took part in second level workshops from 1975 through 1977.

A description of the basic workshop follows. This includes goals, mastery description and a sample syllabus.

5.2.2 Inservice Training

Due to external constraints, many teachers were unable to participate to an optimal degree in the formal workshops offered within the framework of the Teacher Training Laboratory. To overcome this difficulty, members of the Curriculum Development Unit provided inservice type training to individual teachers and subject area committees as they were in the process of preparing courses. Members of the faculty thus acquired experience in some of the basic techniques of educational planning. This approach has proven to be relatively effective. Its advantages include:

A. Participation of a larger number of teachers in teacher training activities.

B. The need to make teacher training directly relevant to the tasks at hand. The teachers applied their newly acquired knowledge to solving real problems with which they were confronted at the time.

C. The value of teacher training was apparent and convincing to members of the faculty as a consequence of the immediate applicability of skills learned. Motivation among teachers was therefore high.

There were two distinct disadvantages:

A. A lack of in-depth treatment of some of the basic educational issues, due to the epirical and pragmatic orientation of the teacher-training activities.

B. A lack of cohesiveness in the training activities. Many teachers, for example, learned segments of the CEDH model without comprehending it in its entirety. This ecclectic approach characterized the "on-the-job" type of teacher learning.

5.2.3 Development of Units of Instruction

The development of units of instruction was, from the outset, viewed as one of the most important activities of the Faculty Teaching Laboratory. Implicit in the many innovative components of the curriculum which involve areas of integrated teaching is the potential for lack of clarity in the mind of the teacher and consequently on the part of students concerning the content and boundaries of what is to be learned. The first purpose of the unit of instruction is to clearly define the content and boundaries of the subject matter and competencies being taught. Related to this dimension is that of the depth to which the learning is to take place. This then constitutes the second purpose of a unit of instruction; specification of the depth of knowledge or skill expected of the student at that particular stage of medical studies.

The classic approach is the specification of instructional objectives in behavioral terms. Experience in year 01 suggests that this approach is useful in the "skills" or procedures area, but is of more limited value when dealing with subject areas which are primarily cognitive in nature. Behavioral objectives in the cognitive area as prepared by the teachers were more often than not perfunctory in nature and constituted little more than an attempt at a semantic solution. Verbs were added to statements of topics with the net result that the objectives were of little utility in developing criteria for evaluation or for the selection of teaching methods. Worse, teachers had the impression that by such semantic manipulations something had been accomplished!

A different approach was used in years 02 and 03. For each unit of instruction teachers specified the main subject area and a set of topics. They were then required to develop test items for each of the topics at three levels; recall, application, and problem solving. If the teacher was unable to develop appropriate test items for a given topic, its inclusion in the unit of instruction was questioned. As might be expected the bulk of questions initially fell into the recall category. Within the framework of the Faculty Teaching Laboratory, teachers gradually learned to move from recall to higher cognitive levels. Given the absence of any previous experience on the part of most teachers, the progress achieved during year 03 is considered satisfactory.

The next step, taken 03, was to weight the questions according to whether the competency being tested is considered to be essential, important or recommended. This is discussed in some detail in the evaluation section of the present report. As this procedure is introduced into the units of instruction it will be possible to build a competency-based criterion referenced evaluation system.

Once the instructional objectives in terms of boundaries, content and depth have been identified the methods of teaching can be considered. In selecting the teaching methods the question of the extent to which they are likely to meet the instructional objectives is assessed. The methods for teaching are specified in the unit of instruction as are the methods of evaluation and the prerequisites.

It is anticipated that in year 04 the next step to be taken in the development of the units of instruction is to use them as the point of departure for production of self-instructional learning packages. This type of development is illustrative of the "successive approximation" approach to educational development. In the summer

of 1974 the idea of having teachers work on instructional packages would have seemed very far-fetched. However, in 1977 this proved to be feasible after several generations of units of instruction had been produced, each incorporating features not present in the preceeding versions. The evaluation may be summarized as follows

year 01	1974-5	Teachers prepare syllabus for each portion of the course; effort to specify objectives and provide guidance questions. No standard format used;
stage 1		Emphasis is on getting teachers to "put something down on paper" as the first step towards the development of units of instruction.
year 02	1975-6	A standard format for units of instruction is adopted which specifies: general subject area; topics; for each topic, guidance questions classified as recall, application or problem-solving; behavioral objectives for skills; teaching method; method of evaluation; prerequisites; suggested readings.
stage 2		
year 03	1976-7	Revision of original units of instruction on the basis of one year's experience. Weighting of guidance questions according to whether the competency being tested is judged to be essential, important or recommended. Building of evaluation system with progress and post-tests based on questions considered as essential; institution of criterion-referenced testing and implementation of remedial loops.
stage 3		
year 04	1977-8	Development of self-instructional learning packages based on units of instruction; introduction of multi-media learning materials.
stage 4		
year 05	1978-9	Constant review of guidance questions, and revisions based on debriefings and other sources of feedback.
stage 5		

The above time-table indicates how what is not feasible to achieve "at one shot" may be programmed over a period of time. This approach may succeed in making possible educational innovation under circumstances where limited resources would preclude the possibility of success over the short term.

In their present form the units of instruction serve to:

1) delineate the scope, content and depth to which the subject area is to be taught in a way which is relatively clear to both teachers and students.

2) provide criteria according to which appropriate teaching methods may be selected.

3) develop a criterion-based evaluation system linked to the guidance questions.

4) communicate the nature of the teaching to other teachers in the process of trying to achieve optimal horizontal and vertical integration.

The various courses are at different stages of development. Some are in stage 1; others are in stage 3 ready to move into stage 3 according to the time-table described above. One of the main function of the Faculty Teaching Laboratory is to aid teachers in moving through the various stages of developing units of instruction.

5.2.4 Development of Learning Packages in Educational Methods

The principle mode for teacher training utilized during the first 2 years to prepare new members of the faculty for their educational responsibilities has been short term workshops as described in the beginning of this chapter. The results, judged by the extent to which participants applied the approach and technical methods (e.g., preparation of units of instruction) in their teaching activities, have been satisfactory. The problems have been mainly of a logistic nature and have included:

- difficulties in obtaining released time (3-6 days) for faculty members, particularly in the case of clinicians in the hospital and the ambulatory care clinics
- scheduling of workshops so that new part-time faculty members from outside of the Beersheva region are able to participate
- time lost from other activities on the part of staff of the Curriculum Unit who are involved in planning and implementing the workshops

In the light of these considerations other options for teacher training were reviewed. That such training is necessary has been amply demonstrated. In instances where faculty have started teaching without adequate training, the results have reflected the lack of preparation. Given the constraints in the Beersheva situation, a reasonable approach is the development of self-instructional learning packages for teachers in the different aspects of teaching methods which are specifically relevant to the needs of the Ben Gurion University of the Negev Medical School. Such an approach necessitates a relatively high initial capital outlay. The development of multi-media packages will require the investment of considerable staff time in addition to equipment and disposal supplies. The investment, however, can be amortized over a period of time. The packages could be used on a purely self-instructional basis, or they might be utilized in conjunction with intensive short (1 day) workshops. The following advantages might be anticipated:

1) When used in conjunction with a workshop - the learning packages could shorten the time necessary for the workshop, thus reducing the logistic problems. They might also incorporate a guidance system (similar to that in the book "Systematic Curriculum Design" by Segall et al. which would serve as a bridge between the workshop learning setting and the "real world" conditions under which participant will be applying the methods to the development of his own courses. As a result of logistic benefits it would be possible to hold workshops at more frequent intervals and at shorter notice. In view of the fact clinicians join the staff of the hospital throughout the year rather than in a concentrated fashion - this possibility would provide for better training prior to assuming teaching responsibilities.

2) For those members of the teaching staff who are unable to attend workshops - the learning packages would provide an opportunity to acquire the desired competencies on their own. This possibility would address the problem of the teacher who because of distance from Beersheva or stringent time constraints is unable to attend a workshop.

The following learning packages are currently in production:

a) Health Care in the Negev: history, present status, needs, Health Sciences Center, role of the Medical School.

b) Ben Gurion University: history, description of the faculties, regional approach, student composition, plans for the future.

c) The School of Medicine: background to the foundation of the Medical School, special features, history since foundation, curriculum, student body, faculty, plans for the future.

d) The Curriculum: separate packages for each year of the curriculum - describing in detail the goals and the various subject areas of instruction: for use primarily by teachers assuming responsibilities in the different years.

e) Preparing Units of Instruction: step by step guidance for the preparation of units of instruction - using a basic model and examples which have been developed in Beersheva.

f) Evaluation: describing the system of evaluation used in Beersheva and its rationale; preparation and scoring of test items.

g) Teaching Methods: different teaching methods currently being used in Beersheva, criteria for selection, methods of implementation.

Given the lack of sufficient resources to develop all the learning packages described above simultaneously, priority has been assigned to units e and f since these relate to the competencies which should be mastered by all members of the teaching staff at an early stage of their involvement in the teaching process.

It will be noted that the themes of the packages are similar to those of the basic workshop. Indeed, they represent a division of the workshop into a set of modules. Preparation of the packages will be facilitated considerably by the experience gained with the successive workshops which were held. The syllabus for each section of the workshop will provide the initial frame of reference in developing the corresponding learning package.

5.2.5 Learning Resources Center

The Learning Resources Center, established in year 01, continued to function during years 02 and 03. The Center provided a responsive environment wherein students and teachers had an opportunity to explore approaches to learning beyond those of formally scheduled classes. Participation was on a voluntary basis on the part of students and teachers. Utilization of the Center during years 02 and 03 was less intensive than during year 01. The main reason was the increased instructional responsibilities of teachers who were involved in courses in both the first and second years of the educational program. A second difficulty was the lack of a full-time staff member responsible for this activity. Nevertheless, a small number of teachers used the Center to experiment with production of videotapes, to use movies and slides and to tentatively explore the development of self-instructional modules.

5.2.6 Utilization of Bibliographic Resources in Education

A new activity undertaken within the framework of the Faculty Teaching Laboratory in year 02 was the identification, cataloguing and dissemination among teachers of bibliographic resources available in the literature. The initiation of this activity was guided by two considerations. Firstly, given the paucity of resources in Beersheva there would be little merit in reinventing the wheel. Experience in other settings that has already been reported in the literature and that is germane to the Medical School in Beersheva should help guide decisions taken concerning the curriculum at the Ben Gurion University of the Negev Medical School. Mistakes may be avoided and the teachers in Beersheva can benefit from the successful experience of others. Secondly, in assisting teachers who are primarily cliniciens, research scientists or administrators to acquire the self-image of educators it is considered important to familiarize them with the literature of medical education, and afford them opportunities to consult this literature as they would do in their areas of interest in clinical medicine or research.

To this end several steps were taken. Firstly, a classification system was developed based on the manner in which the various subject areas are taught in Beersheva. Secondly, references were filed according to this classification system. The first set of references was obtained by reviewing the Medlar listing in the Journal of Medical Education since its inception. Secondary bibliographic sources were then identified and the bibliography is updated from time to time. Thirdly, the bibliographer attends meetings of the subject area planning committees. At these meetings he identifies areas in which bibliographic resources from the medical education literature are likely to be of help to the committee members. Faculty members are also invited to contact the bibliographer at their own initiative. Fourthly, abstracts or xeroxed copies of the articles are made available.

Experience to date suggests that teachers welcome and appreciate this bibliographic assistance. It is anticipated that it will expand in the future.

5.3 Impact of the Faculty Teaching Laboratory

The impact of the Faculty Teaching Laboratory can be assessed in terms of teacher attitudes, the degree to which appropriate competencies are acquired, and the extent to which the competencies are actually applied. In making this assessment with respect to Beersheva the following factors are of significance.

1) Most of the teachers had little or no previous teaching experience. There was a widely felt need for training in educational methods accompanied by a readiness to entertain new ideas. A certain prestige was associated with having participated in a workshop.

2) An important part of teacher preparation concerned the internalization of the goals and ideals of the Medical School as well as an approach toward educational planning and evaluation which was initially quite foreign to most members of the faculty.

3) The mastery description which determined the types of teacher preparation activities and their respective priorities was clearly defined. Thus the ways in which competencies acquired could be applied was well understood by both the staff and by the participants. This meant that attention could be focused in those areas where the needs were most important.

4) Members of the teaching staff come from very different educational backgrounds. Physicians, for example, bring to their teaching activities expectations which to a large extent depend on their own experiences in Medical School which may have been in Jerusalem, Bucharest, Moscow, Paris, Sao Paulo, Algiers, Capetown, London, etc. This heterogeneity of background and expectations certainly contributes to the variety of ways in which teachers perceive their educational responsibilities.

Taking into account these factors, it is clear - three years after the founding of the Medical School - that teacher training activities carried out within the framework of the Faculty Teaching Laboratory contributed substantially to the implementation of the curriculum as it presently exists in Beersheva. In the absence of such activities many of the critical dimensions of the educational program would have been stillborn, as beautiful plans on paper only. Among the accomplishments of the Laboratory are the following:

1) It constituted tangible evidence of the commitment of the Medical Schools to the approach towards teaching which had been "proclaimed" at the time of its founding.

2) It helped create a community of teachers who identified with each other and with the goals of the school.

3) It helped the individual teacher to develop an image which reflected, in addition to his own primary professional role such clinician, researcher or administrator, that of an educator - with the sources of satisfaction and sense of responsibility which this implies.

4) It gave teachers the tools to do what was expected of them, thus enabling them to translate good intentions into concrete actions.

5) It provides a mechanism for feedback to the Curriculum Unit which enabled the unit to identify new training needs as they arose and to be responsible to the perceived needs of the teachers.

It is to be anticipated that the activities of the Faculty Teaching Laboratory will be strengthened in the future. An emerging need which has not as yet been addressed is "enrichment programs" for faculty who have experienced basic teacher training and have acquired some measure of teaching experience. As pointed out in earlier sections of this chapter, new projects are envisaged. These will be implemented within the limitations imposed by the manpower and funding which is available.

5.4 Methods of Evaluating the Faculty Teaching Laboratory

The evaluation of the teaching process as distinct from the measurement of competencies acquired by students provides information concerning the effectiveness of teacher training activities.

Two methods are used:

1) Debriefing sessions. These sessions are held at the end of each course or major segment of a large course. Participants include student representatives, teachers and staff of the Curriculum Unit. The agenda consists of a) review of the syllabus and units of instruction to determine the extent to which the educational objectives have been met, b) identification of examples of effective teaching procedures used in the course and examples of teaching methods judged to be less effective, c) formulation of a set of recommendations for the planning of the next offering of the course.

   By the end of year 03 debriefing sessions had become fully institutionalized and part of the "tradition" at Beersheva. They serve two major functions. Firstly, they provide an opportunity for informed student input into the curriculum development process. Students feel a sense of greater involvement and to a certain extent control with respect to the educational process. Secondly, specific recommendations are formulated with can serve as guidelines to the subject area committees and instructors in planning future offerings of the course. Areas in which additional faculty training in methods of instruction are identified in this way.

2) Student questionnaires. Questionnaires are completed by students at the end of each course. These provide an additional source of information concerning teaching effectiveness and the instructional proce s.

REFERENCES

1) See Interim Report I; page 3-2

Interim Report II; page 17

2) See Interim Report I; page 4-6

Interim Report II; page 30

6. The System for Evaluating Student Performance

The evaluation of student performance and the teaching process are of particular importance in a new Medical School which is innovative in both the content of the curriculum and the methods of instruction. While the long term impact of the undergraduate experience is of primary interest, during the period of the present contract there was no alternative but to focus attention on the evolution of knowledge, skills and attitudes during the course of the first three years of the educational program.

Principles for Evaluation of Student Competencies

- Evaluation will be *competency based.*
- The competencies to be evaluated will be *weighted* according to explicit criteria
- Evaluation of essential competencies will be *criterion referenced* while elective competencies may be norm referenced.
- Evaluation will be predominantly at the *problem-solving* cognitive level
- The ability to *integrate* information from different disciplines will be a major focus of evaluation
- Testing will be at the *highest level of simulation* which is feasible
- Evaluation instruments will be developed *prior* to the onset of instruction
- Only summative evaluation will be used for purposes of *certification*
- The results of evaluation will be used for *decision-making* concerning the curriculum
- The optimal evaluation system will be approached through *successive approximations*
- *Attitudes* will be evaluated to the extent that this is possible.

Components of the System

The components for evaluating student performance were adapted from the model developed by the Center for Educational Development in Health to the needs of Beersheva as specified in the principles described above.

- The axis of the system is represented by the *units of instruction* (discussed in Section 7) with their associated sets of guidance questions. These questions constitute a *pool* from which test items are adapted for use in progress and post-tests and the integrative certifying examinations.

- Prior to each course a *pre-test* is given emphasizing entry level competencies. This is generally administered by the instructor and the results are used for identifying the need for remedial intervention in the case of individual students and to alert the instructor to the need for possible modifications of the course as planned.

- *Progress tests* are given throughout the course. They are generally self-administered and self-evaluated by the student who is then responsible for initiating remedial measures if required.

- At the end of each course a *post-test* is given. This is instructor administered and evaluated. Results are used for remedial intervention and planning course modifications. They are not used for purposes of certification.

- *Certification* examinations are given at the end of each year in the first two years. These examinations are *integrative* and test problem-solving skills utilizing knowledge from the various disciplines studied. There are no certifying examinations by individual discipline.

- There are no certifying examination for the integrated organ system modules during the third through the fifth years. Students are expected to successfully take the post-test following each module prior to beginning the related clerkship. Portions of the post-tests may be *repeated* until competency is demonstrated.

- Evaluation of the clinical clerkships is *competency-based*. It encompasses an element of *continuous* monitoring of student performance as well as testing at the end of the clerkship.

- A *final* qualifying examination is projected. At the time this report was prepared the characteristics of this final examination prior to graduation had not as yet been delineated.

Examples of units of instruction are shown in Appendix III and of each type of evaluation instrument in Appendix IV.

6. The System for Evaluating Student Performance

6.1 Introduction[1]

Innovation in medical education often develops out of circumstances which are specific to individual institutions rather than as a result of planning for change at a national or international level. The impact of innovative curricula must therefore be judged in terms of the goals set by the particular Medical School and the constellation of resources and constraints within which it is implemented. Considerable caution is necessary in attempting to generalize from the results obtained at any one institution.

Of primary concern is the impact of innovations in Medical Schools on the *quality of health care*. Curricular change may result in an increased capability of graduates to meet the health needs of the community. The distribution of career choices may become more responsive to the needs of the health care system and the quality of care provided by graduates may improve. Both these factors, however, are influenced by factors other than the nature of undergraduate medical education. Choice of specialty and selection of geographic area in which to practice may depend on such factors as personal background, economic incentives and family considerations. The relative contribution of undergraduate medical education to the quality of ultimate physician performance as compared with that of subsequent post-graduate studies has yet to be clearly established.

Under these circumstances of multi-factorial relationships, it is difficult to trace the long term impact of the Medical School experience. Consequently, attention has focused on the evolution of knowledge, skills and attitudes *during the course* of the undergraduate medical program itself. The relationship over time of such variables as clinical skills, attitudes towards patients and career projections to different components of the curriculum has been studied particularly when major curricular innovations have been introduced. In the absence of definitive evidence, this approach rests on the logical premise that competencies and attitudes acquired during Medical School do indeed exert a significant effect on the future behavior of the student.

The evaluation of student performance and the teaching process assume a special importance in a new Medical School which is innovative in both the content of the curriculum and the methods of instruction. Careful assessment of student competencies is necessary in order to judge the effectiveness of the program of studies and to monitor the outcome of the educational program. Continuous evaluation of the educational process and instructional methods is needed in order to make decisions concerning the retention, modification or discontinuation of either innovative or traditional approaches to teaching. It is perhaps important to note in this context that the Medical School in Beersheva is not committed to innovation per se, as a goal in itself. Rather the commitment is to making explicit the institutional goals, deciding on how to reach these goals using educational rather than "political" or other criteria for decision-making, and evaluating the extent to which these goals are being met. In years 01, 02 and 03, this approach has resulted in the adoption of a number of innovative ways to develop and implement the curriculum. It has also led to the utilization of what might be considered to be more traditional modalities of instruction where this seemed to be more appropriate. Logistic considerations including the small class size preclude any serious effort to base evaluation on an experimental design. Careful observation is therefore necessary to provide feedback for making informed decisions.

In addition to trying new teaching methods, the Medical School in Beersheva has also adopted a significantly different approach to the organization and sequencing of curriculum content. The description given in the report for year 01 still holds true. Students begin learning in each of the three major clusters of curricular components (basic and medical sciences, clinical medicine, community medicine) from the first week of their studies. The approach is spiral rather than by layers. This organization of curricular content as well as the goal of achieving optimal integration or coordination among the three clusters imposes many difficulties in both the planning and implementation of the curriculum. New techniques of evaluation are needed and have been developed in order to determine the impact of a different organization and sequencing of curriculum content on the learning outcome.

With these considerations in mind, the evaluation system in Beersheva is designed to assess student progress through successive phases of the curriculum and to monitor their professional activities in subsequent stages of their careers. The longitudinal data acquired will serve to measure the long term impact of the curriculum and to provide feedback for continuous curriculum development. Plans for follow-up of graduates have been developed. Career choice, post-graduate studies, geographic area selected for practice and type of practice are among the variables to be monitored. This component of the evaluation system will be implemented when the first cohort of students graduates.

Measurement of student progress during the course of medical studies has received considerable attention in Beersheva. A principal concern has been to adapt the evaluation process to the educational goals of the Medical School. Evaluation instruments used in the core curriculum are designed to determine the extent to which competency-based objectives have been achieved. They are independent of the particular teaching methods adopted and provide, in part, criteria for evaluating the instructional methods used. As indicated earlier, each competency is weighted in terms of the degree to which it reflects institutional priorities and the extent to which it constitutes a pre-requisite either for ultimate physician practice or for entry into a subsequent phase of the curriculum. Testing of competencies judged to be essential will be criterion-referenced with all students expected to achieve a specified level of mastery. In evaluating the elective components of the curriculum, a greater degree of discretion is accorded to individual teachers.

Institutional goals are reflected in the *process* as well as the content of evaluation. Prior to each course a pre-test is given which assesses the entry-level competencies required. The results are used to identify the need for remedial intervention in the case of individual students and to alert instructors to the need for possible modification of the course as planned. Progress tests are given throughout the course. To encourage individual initiative in learning, these are generally self-administered and self-evaluated by the student who is then responsible for initiating remedial measures if required. At the end of each course, a post-test is administered. These procedures comprise the formative component of the evaluation system. Results are used for remedial intervention and planning course modification. They are not used for purposes of promotion.

While focusing on the content of a specific course, these various tests may incorporate integrative elements from other courses taught concomitantly or earlier. Vertical integration is encouraged by basing the post-tests of introductory courses on the pre-requisites required for advanced courses. Test items emphasize problem-solving skills rather than recall skills and simulate conditions of professional performance insofar as this is appropriate and feasible.

Summative examinations are administered at the end of each phase of the curriculum and are used to certify student competency and readiness to enter the next phase of the educational program. They also serve to determine the relative standing of the students.

6.2 Evaluation of Student Competencies

Principles

The elaboration of a system for evaluating student competencies has been guided by the following principles:

1) Evaluation will be competency based. Implicit in this principle is a commitment to an a priori delineation which students are expected to achieve. These are independent of the particular methods of teaching adopted, and in fact provide, in part, criteria for evaluating the instructional methods used. These competencies are derived in the first instance from the institutional goals which define them in terms of broad categories. At a higher level of specificity they are formulated by the subject area committees which have the final say concerning the competencies related to their respective areas.

2) The competencies will be weighted according to explicit criteria. In any given subject area - at any point in the curriculum - range of competencies which might be expected of students will probably exceed that which can be learned within the existing time constraints. It therefore appears reasonable to weight each competency in terms of:

   a) the extent to which it is an essential prerequisite for entry into the next stage of the curriculum.

   b) the degree to which it is relevant to ultimate physician performance.

   c) the extent to which it is conducive to developing the student's ability to deal with future problems which are poorly defined or understood in the light of the current state of knowledge.

   d) the extent to which it might more appropriately be taught at a later stage in the curriculum.

The competencies included in all subject areas at each stage of the curriculum are weighted in accordance with the above criteria and are classified as either "essential" or "recommended" for the respective subject areas and stages.

3) Evaluation of essential competencies will be criterion referenced while recommended competencies may be norm referenced. All students will be expected to achieve mastery of those competencies classified as essential before entry into the next stage of the curriculum. These will be criterion referenced according to a description of mastery which is appropriate to each subject area and stage of the curriculum. Those competencies which are considered as recommended without being essential for entry into the next stage of the curriculum may be norm referenced.

4) Evaluation will be predominantly at the problem-solving cognitive level. In accordance with the general institutional goals the emphasis will be on the problem-solving level of testing. Less weight will be given to those competencies which rely on recall skills alone.

5) The ability to integrate information from different disciplines will be a major focus of evaluation. This competency is closely related to that of problem-solving. It is delineated separately since it has important implications for the design of evaluation instruments.

6) Testing will be at the highest level of simulation which is feasible. Within the constraints of what is feasible, an effort will be made to test at high levels of simulation.

7) Evaluation instruments will be developed prior to the onset of instruction. To the extent that this is accomplished, the evaluation instruments can help the course designers select course content and teaching methods in a less arbitrary manner.

8) Only summative evaluation will be used for purposes of certification. Formative evaluation will be used for identifying student learning problems, initiating remedial intervention and for making decisions concerning course revision. It will not be used for certifying purposes. Certification will be a function of an annual final examination at the end of each year.

9) The results of evaluation will be used for decision-making. This may appear self-evident. Nonetheless, it merits an explicit statement. The formative component of the system will aid students to decide on study patterns and will aid teachers to decide on course modifications. Unless this occurs it will be difficult to justify the rather complex system of evaluation which is described below.

10) The optimal evaluation system will be approached through successive approximations. It would be unreasonable, given the constraints and the lack of resources, to expect that the evaluation system described below could be implemented "at one fell swoop". An attempt to do so might well result in so much frustration on the part of teachers that the entire concept might be rejected. The goal then is to adopt parts of the system each year in a cumulative manner until the entire system is in operation. This will also permit adjustment of individual components and relationship between components to take place on the basis of experience gained over successive years.

11) Attitudes will be evaluated to the extent that this is possible. Many of the important educational goals which characterize the Ben Gurion University of the Negev Medical School are of an attitudinal nature. While cognisant of the difficulties involved, a determined effort will be made to assess the extent to which these attitudinal objectives are being achieved.

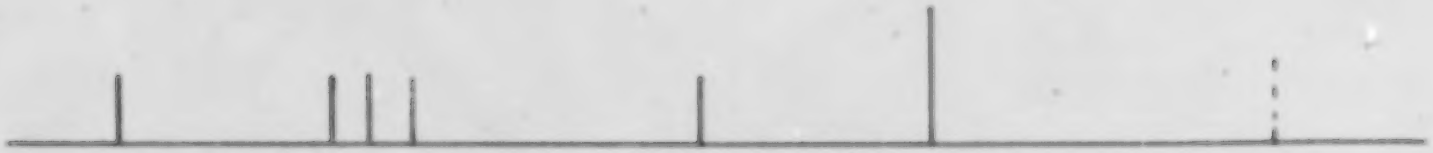
6.3 Components of the System

The components of the system for evaluating student performance as it has been developed are shown in figures 1 and 2. It represents an adaptation of the model developed by the Center for Educational Development in Health to the needs of the Beersheva as specified in the principles described above. The axis of the system is represented by units of instructions with their associated sets of guidance questions and specification of skills to be acquired. Prior to the course, a pretest is given emphasizing the entry level competencies required. This is generally administered and evaluated by the instructor, and the results are used for identifying the need for remedial intervention in the case of individual students and to alert the instructor to the need for possible modification of the course as planned.

Progress tests are given throughout the course. This is generally to be self-administered and self-evaluated by the student who is then responsible for initiating remedial measures if required. At the end of each course a post-test is administered. This is instructor administered and evaluated. The results are used to determine the need for further remedial intervention in the case of individual students and to assist the instructor in planning the course for the next academic year. While focusing on subject matter directly taught within the course itself both progress and post-tests may incorporate integrative elements which encompass competencies related to other courses as well. The sequence of evaluation procedures described thus far comprises the formative component of the entire system. Results are used for remedial intervention and planning course modifications. They are not used for purposes of certification.

Certification is based on a final examination given at the end of each academic year. It is integrative in nature, and its design stresses problem-solving rather than recall skills. It is summative in that it is based on test items appearing in the various evaluation instruments used in the courses throughout the year. The process of item selection is described below. There are no separate examinations in each of the disciplines at the end of the year. Results of the final examination are used to certify student competence and readiness to enter the next stage of the educational program, and to determine the relative standing of students. Students failing to demonstrate competency in specific areas are required to demonstrate satisfactory achievement in these areas before proceeding to the next stage of the academic program. The final and supplemental examinations are designed by the Curriculum Unit in close association with the Coordinating Committees of the respective years. The Curriculum Unit is also responsible for assessing the results of these examinations.

FIGURE 1. System for Evaluation Adopted in Beersheva (adapted from the model described in: Systematic Course Design for the Health Fields; Segall, Vanderschmidt, et al., Wiley, 1975.)



what is being evaluated	entry level competencies for each course	intermediary competencies for each course	terminal competencies for each course	terminal competencies for each stage of the curriculum	unachieved terminal competencies
when it is being evaluated	before each course	during each course	at the end of each course	at the end of each year	between the final examination and the beginning of the next academic year
evaluation instrument	pre-test	progress test	post-test	final annual examination	supplemental examination

FIGURE 2. Components of the Evaluation Process

Evaluation Instrument	Modality	Purpose	Scope	When Administered
Pre-test	Instructor evaluation	Primarily test for prerequisites	Primarily disciplinary	Prior to instruction
Guidance questions in each Unit of Instruction	Self-evaluation	Guidance for students	Primarily disciplinary	During instruction
Progress tests	Self or Instructor evaluation	Identification of learning problems	Disciplinary and integrative	During instruction
Post-test	Instructor evaluation	Identification of learning problems and Evaluation of course	Disciplinary and integrative	At end of course
Final examination	Institutional evaluation	Certification and identification of areas for retesting	Primarily integrative	At end of year
Supplemental examination	Institutional evaluation	Certification	Primarily integrative	Prior to beginning of subsequent year

6.3.1 Sources Classification of Test Items

The basic pool of test items lies in the guidance questions and skill descriptions associated with the units of instruction. These are developed and classified in the following way:

1) The subject area committee responsible for the unit of instruction specifies the topics to be addressed within the framework of the unit.

2) Drawing on its combined wisdom and experience, the committee, for each topic, develops a set of questions at the recall, application and problem-solving levels. As a first approximation these questions embody the competencies that the committee feels will be required in future client courses or which are judged to be fundamental to an understanding of the subject area.

3) The questions included in this first approximation may be modified on the basis of:

   a) suggestions by subject matter experts other than those in the subject area committee.
   b) the prerequisities formulated by horizontal or vertical client courses.
   c) suggestions by instructors involved in the teaching of corresponding client courses in other institutions.
   d) suggestion by experts in the technical area of item construction.

   These suggestions will most probably be less concerned with content than with the appropriateness of the cognitive level at which the question is asked.

4) Following inputs from the various sources enumerated above a bank of questions for each of the topics is developed. A particular competency may be tested by a variety of questions or variations thereof. Those which are actually included in the unit of instruction constitute a sample from this pool. Those not appearing in the unit of instruction are available for use in progress and post-test as well as for construction of the final examination.

5) The pool of test items can be expected to vary over time as a function of experience, changes in prerequisites from client courses, increased breadth of input from appropriate consultants from outside the committee, recommendations arising from debriefing sessions, and changes in the composition of the committee itself. Over time the proportion of arbitrary decisions can be expected to decrease.

6) As the pool of test items is being developed, weights are assigned to each item according to criteria described in the section on principles above. Each question, or more accurately, the competency it tests, is classified as either essential or recommended. This procedure serves at least three functions:

a) The student knows for which of the competency-based objectives he will be held responsible on a criterion-referenced basis, and which are recommended as "nice to know" but are not critical for his future. At present these are jumbled together in such a way that the student usually ends up by knowing a bit of both. Under the approach described here, he will be able to plan his pattern of studies to assure mastery of the essential elements. The degree to which he studies the recommended elements will depend on such factors as motivation and the presence or absence of learning problems. Each student will be free to select which subject areas are of sufficient interest to address the recommended as well as the essential competency-based objectives.

b) The instructor is clearly aware of priorities in teaching. He can thus more effectively structure the content of the course and adopt appropriate methods of teaching.

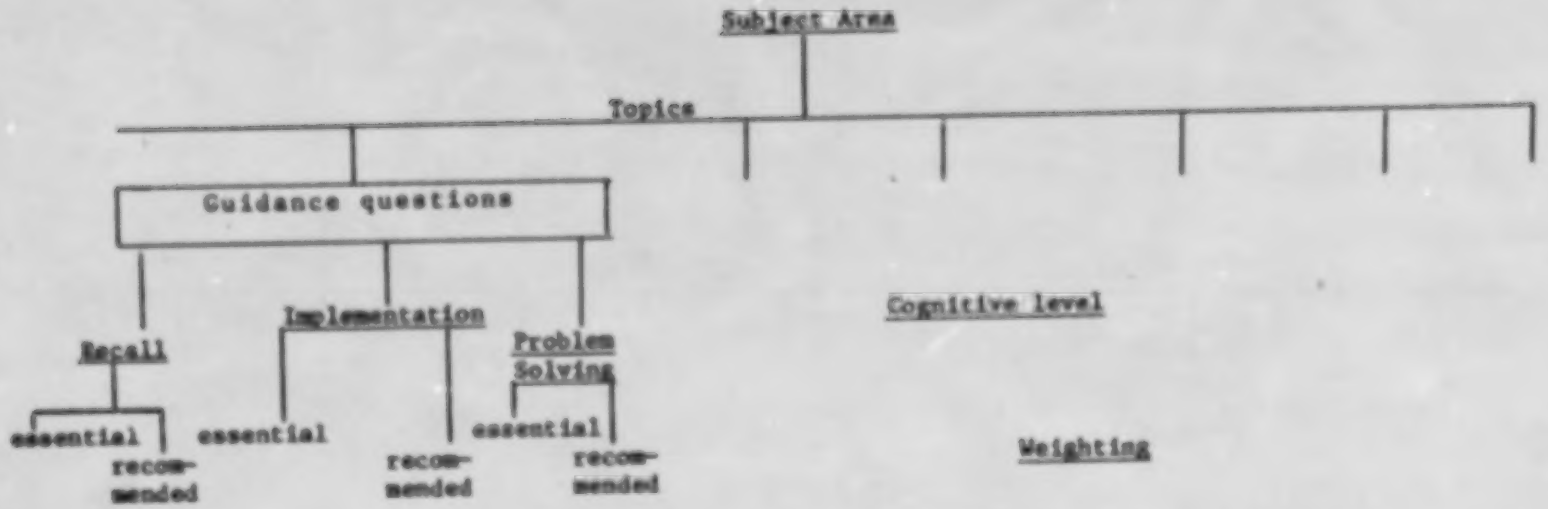
c) Test items for progress and post-tests can be drawn or adapted from the bank of items related to each competency. These tests will stress "the essential," but the teacher will be free to include sample of "the recommended." Thus, a measure of flexibility is afforded to the instructor. He will be held accountable for "the essential," but can also address "the recommended." It will be clear that as far as progress and post-tests are concerned, remedial intervention should be directed almost exclusively at problems which arise concerning "the essential."

7) Only test items related to the essential competency-based objectives will be used on the final examination to determine passage of the student to the next stage of studies. These may relate to items which appear in the guidance questions or in the progress and intermediary tests. The student is consequently well aware that in acquiring mastery in relation to the essential objectives throughout the year, he is at the same time preparing for the final certification examination. This should help shape a positive attitude among students towards the formative component of the evaluation system. It will also reduce the build-up of anxiety among students as the time for the final examination approaches.

8) Figure 3. shows how the guidance questions for a particular topic within a unit of instruction are classified. Figure 4. summarizes the manner in which the pool of guidance questions is used to set questions for the progress and post-test and for the final examination.

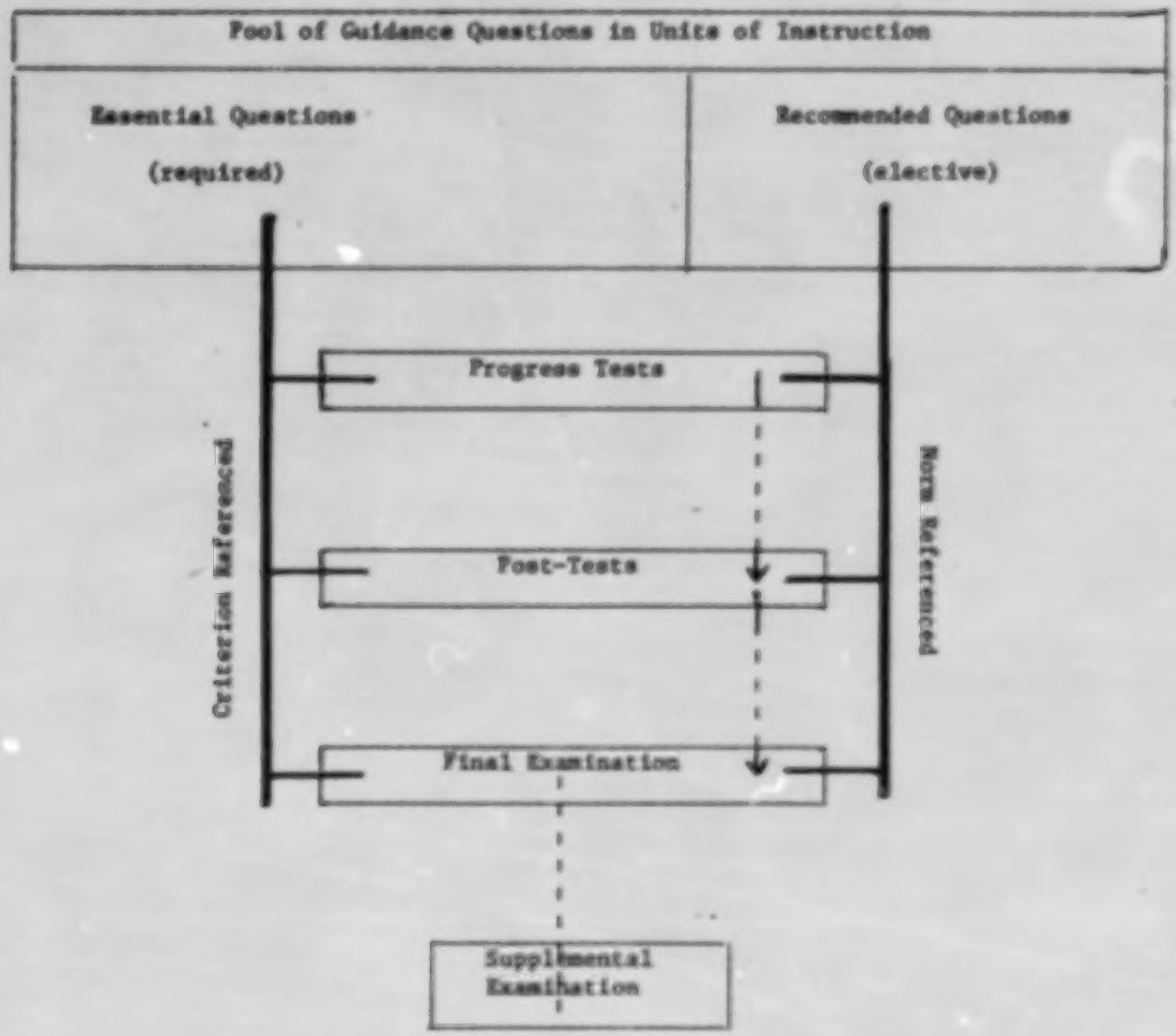
In summary, once a unit of instruction is developed with topics (corresponding to a set of competency-based objectives), the preparation of test items can begin. Questions related to each topic are formulated at the recall, application and problem-solving levels. These are then weighted and classified as essential or recommended. A sample of questions appears in the unit of instruction as guidance questions. The basic pool of questions remains the source for questions to be used in progress and post-tests and for the final examination. Certification on the final examination is based exclusively on the pool of questions classified as "essential."

FIGURE 3. CLASSIFICATION OF GUIDANCE QUESTIONS WITHIN UNITS OF INSTRUCTION



6-12

FIGURE 4. Source of test items for evaluation instruments



6.3.2 Pre-test

The function of the pre-test is twofold. Firstly, to determine whether the student has acquired those competencies which constitute prerequisites for entry into the course. If one or more of these are lacking, it is the student's responsibility to take remedial action prior to the beginning of the course. Secondly, to determine whether the student has already acquired competencies which it is the purpose to teach. This information can be used in two ways: to release the student from participating in the course and to enable the teacher to modify the course if this appears appropriate.

The prerequisite component of courses taught in the second and subsequent stages of the curriculum have an additional utility. They reflect expected entry level competencies for what might be called client courses since these courses assume that students have acquired the prerequisites in earlier courses within the curriculum. These prerequisites should therefore be included in the post-test of earlier related courses. Thus, for example, the post-test for the section on physics which deals with electricity in the first year should test for those competencies which are prerequisites for the course in analysis of biomedical signals which is given in the second year. Similarly, the post-test for the biomedical signals course should incorporate the entry level requirements for the section on electrocardiography which is given within the framework of the cardiovascular system within the integrated organ system portion of the third year curriculum.

Through this process the distinction between essential and recommended competencies becomes less and less arbitrary as each competency classified as essential is related to subsequent subject areas to be taught. The process can not be complete until the entire six year curriculum is in operation. Once this occurs it may be anticipated that courses will continue to be modified as prerequisites of related client courses change.

6.3.3 Guidance Questions

The process for developing guidance questions for the units of instruction has been described in some detail in an earlier section of this chapter. These questions are a sample from a larger pool relating to each of the topics. The topics themselves delineate the areas in which student competency is expected. The guidance questions spell out the nature of the competency. They serve to clarify for the student the expectations he is required to meet. Emphasis is on questions at the problem-solving level. The student will be held accountable for all questions classified as essential, and is free to address the recommended questions as a function of personal time constraints, degree of interest from course to course, etc. Feedback on guidance questions is mainly from class discussions. Questions on the final examination on which grading is based will be drawn only from the pool of questions classified as essential. Thus this pool is the central element of the entire evaluation system and serves as the source of test items for all of the evaluation instruments.

6.3.4 Progress Tests

Progress tests can be given throughout the course, at the instructor's option. Test items are drawn from the essential and recommended pools of the various units of instruction. The emphasis is on items classified as essential which are criterion referenced. The student is aware that he will be held accountable for the competencies which these items test and that they will serve as the basis for certification in the final annual examination. Progress tests provide an opportunity for students to identify learning problems without being penalized since they are not used for purposes of certification. Questions from the recommended pool may also be included in the progress test. These provide an indication to the teacher of the extent to which students have gone beyond the minimum requirements as represented by the essential test items. The instructor is responsible for assuring acquisition by students of the essential competencies and will be held accountable for this. On the other hand, he may address in his teaching recommended competencies to whatever extent he chooses, provided, or course, that these are not taught at the expense of the essential.

Progress tests should in general be self-administered with indications for remedial study provided for each test item. This places responsibility for identification of learning problems and initiation of remedial action squarely on the student. Tutoring by more advanced students and instructor intervention form part of the remedial loop as described of this chapter.

The progress tests may incorporate questions which are integrative as well as those which are exclusively disciplinary. Interdisciplinary questions help students achieve the ability to integrate which will be measured on the final examination.

6.3.5 Post-tests

Post-tests are similar to the progress tests and the same considerations, as discussed above, apply. They sample from the whole course rather than from one part. Questions are drawn from the same pool as for the progress tests. Emphasis is on the essential items. There may be more opportunities for integrative questions than on the progress tests. As part of the formative evaluation, the results of post-tests are not used for certification, but rather to identify outstanding learning problems and indicate the need for additional remedial intervention. As distinct from progress tests, post-tests should, in general, be instructor administered. This enables the instructor to identify students who require remediation. It also provides the instructor with information to help plan subsequent offerings of the course.

The use of post-test in the manner described above is predicated on the student utilization of the earlier progress test in the manner prescribed. If this does not occur and student performance on the post-test indicates a need for major remedial intervention, the student will be at a considerable disadvantage since he will have to engage in remedial activities while taking other courses. This potential problem points to the need for a clear understanding of the evaluation system on the part of students and provides motivation to abide by the ground rules.

Post-tests represent the primary method of evaluation for each of the integrated organ system modules in Phase III. During this phase there is no annual integrative examination.

6.3.6 Annual Integrative Examination

Rationale

The evaluation system incorporates a final annual integrative examination which is used for purposes of certification. A translation of the integrative examination given in July, 1975 is shown on pages 359 to 412, and an analysis of the results is given on pages 414 to 421.

The rationale for an annual integrative examination is as follows:

1) Institutional educational goals of the Medical School stress the development of both problem-solving skills and an integrated approach to medicine. The curriculum is designed and taught in a manner which will encourage the development of these competencies. It therefore appears reasonable that the instrument for summative evaluation at the end of each year test for these competencies and that institutional certification be based on how the student performs with respect to them.

2) An integrative type of examination can be designed at a high level of simulation which is consistent with the principles enunciated at the beginning of this chapter. In effect, an integrative approach permits evaluation of the extent to which the student at the end of each year resembles the type of physician the Medical School would like to see at the end of the period of studies. With each successive year, the level of simulation at which evaluation takes place increases.

3) By holding the examination at the end of the academic year, the test items can reflect student learning over the span of the entire year. A disadvantage is the arousal of student anxiety, since the results are used for certification. This problem can be at least partially overcome by basing certification only on the essential component of the total pool of test items and by providing students with ample opportunities to identify learning problems with respect to this well-defined component as well as with sufficient possibilities for remedial activities.

4) The integrative examination serves as a very effective method for teacher training. This has been recently well demonstrated. Teachers who took part in the development of the integrative examination given at the end of the first year of studies in July, 1975 have modified their teaching in the 1975-6 and the 1976-7 academic years to place increased emphasis on problem-solving and integrative skills.

Process of Development

The process of developing the integrative examination involves representatives of all disciplines taught in the respective year. The actual examination is constructed by successive approximations. Questions relating to a particular discipline are, in the last analysis, the responsibility of the representative of that discipline who must authorize the definitive text of the test-items and certify the scoring procedure. Considerable support is given by the Curriculum Unit in planning the overall examination, and in constructing the test items.

6.3.7 Evaluation of Clinical Clerkships

Development of methods of evaluation of the clinical clerkships began in 1977. At the time this report was prepared, a definitive evaluation plan had not as yet been formalized. It is anticipated that the plan will:

a) be based on the specific set of competencies which constitute the objectives for each clerkship

b) incorporate a criterion-referenced component which reflects those competencies judged to be essential at each stage of the clerkship program

c) be, at least in part, based on continuous observation rather than solely on an evaluation instrument administered upon completion of the clerkship. This formative element will permit remedial intervention during the course of the clerkship

d) include peer evaluation as one element of the evaluation system.

REFERENCES

1) See

Interim Report I; page 3-4

Interim Report II; page 342

First Quarter Interim Report;
Year 03; page 4

HIGHLIGHTS

7. Special aspects of the Beersheva program

During the course of the present contract several aspects of the Beersheva program emerged which may be of special significance in terms of implications for medical education in the United States.

1. The Admissions Process

- Designed to select candidates on the basis of adequate performance in previous studies and according to a set of specified intellectual and personality characteristics. While previous *academic achievement* is not ignored, this approach places considerable emphasis on the consonance between the expectations and *goals of the applicant* and the *objectives of the Medical School*.

- There are *four stages* to the selection process. The first two stages consist of meeting entrance requirements and taking an entrance examination. These are based on *threshold* or cutoff points. A candidate far above the threshold has no advantage over one who has just reached the threshold; both move to the next stage.

- In the third stage each candidate is interviewed by *two teams of interviewers*. Each team consists of a physician and a member of the community in the Negev. The interviewers undergo a period of training prior to conducting the interviews. At this stage the focus is on value and personality characteristics of the candidate, the experiences which shaped them and of greater importance, through which they had been expressed. Interviewers do not have access to results of the first two stages.

- In the fourth and final stage, the candidate is interviewed by a *third team*. The results of all three previous stages are considered together and the final decision is made.

- The admissions process in Beersheva results in classes which are quite *heterogeneous* with respect to previous academic background and performance as well as social and cultural background. This has had major implications for the type of curriculum needed.

2. Community ambulatory teaching clinics

- The establishment of ambulatory teaching clinics relates to the two goals which distinguish the Medical School in Beersheva from others in Israel. The first is to utilize the academic establishment as a means to develop and implement *changes in the health care system* of the Negev region. The second is to *abstract medical students* to the field of primary care.

The role of these clinics is to provide *community-based counterparts* to the clinical facilities of the teaching hospitals. They will serve as sites for experimenting with new patterns for delivering primary health care and provide settings with appropriate *role models* for undergraduate and graduate educators.

Hospital-based physicians will provide consultive services to the clinics and the primary care practitioners will assume appropriate responsibilities for the care of their patients who are hospitalized.

During the hospital-based portion of the clerkships students will follow patients, who, after discharge, return to the clinics for continuing care. As part of the primary care clerkships they will follow patients during periods of hospitalization.

3. Learning Resources Center

The Center seeks to provide a *responsive environment* which would enable students to acquire learning experiences which are not part of the formal program of instruction. These include review of areas covered in formal courses with opportunities for remedial intervention and exploration of new avenues of interest outside the scope of regular courses.

The Center also provides opportunities for teachers to *experiment* with innovative methods of teaching with students participating on an elective basis.

Equipment and instructional software is concentrated in space designated for this purpose. Additional facilities may be mobilized on an ad hoc basis in other parts of the medical school, university, hospital and clinics.

Members of the regular faculty and appropriate guests advise individual students, provide guidance for groups working on projects and participate in special presentations, demonstrations and seminars.

4. Systems for Remedial Intervention

In the light of the heterogeneity of the student body with respect to academic background and the intensive nature of the curriculum, there is a need for careful monitoring of student progress and providing opportunities for remedial intervention.

Providing remedial intervention has proven a difficult task due to the shortage of teachers. In 1977, a new initiative was taken. With four classes of the Medical School comprising some 150 persons, it was possible to *identify potential tutors in a number of subject areas from among the students themselves*. The use of student tutors is consistent with the School's stress on co-operation rather than competition and promises to assure the viability of a system for remedial intervention.

7. Special Aspects of the Beersheva Program

7.1. The Admission Process[1]

The method for selecting among applicants for admission to the Medical School reflects the overall educational objectives of the institution as does the curriculum. The selection procedure, based on a series of stages and thresholds is designed to identify and evaluate the following applicant characteristics.

Intellectual characteristics

1) The capacity to master extensive and complex material.

2) The capacity for self-learning.

3) Intellectual flexibility.

4) Problem-solving capacity (critical, systematic mind).

5) Intellectual curiosity.

Value characteristics

6) The desire to assume responsibility for providing help to people in distress.

7) An interest in community health service.

8) The desire to work in the Negev or elsewhere in accord with the goals of the Center for Health Sciences.

Personality characteristics

9) Personal integrity, honesty.

10) Empathy, interest in people, sensitivity to their suffering.

11) Emotional flexibility (non-dogmatic).

12) Tolerance of ambiguity, yet capable of decision-making in ambiguous situations.

13) Capacity for co-operation with others in an egalitarian spirit without loss of autonomy and leadership ability.

14) Humility.

15) Clear, stable self-identity.

16) Capacity for enthusiasm.

There are four stages to the selection process. Each of the first three stages focused on a different set of characteristics, while only the fourth and final stage was based on a consideration of the total set of characteristics of those candidates who had not been eliminated previously. With regard to the first two stages, thresholds, or cutoff points, were employed. That is, a candidate far above the threshold had no advantage over one who had just made it; both moved on to the next stage.

Stage A. Registration requirements

The Israeli secondary school student is examined in five (sometimes six) national examinations. The Committee posited that matriculation grades can tell us something about the candidate's capacity for academic achievement, a relevant characteristic to the end goal. But there are a great variety of influences which determine the matriculation average, or grades in any one subject.

The decision taken was to require the applicant to have achieved 8 (out of 10) or higher in two examinations. Roughly one-third of those examined receive such grades on each examination. An applicant was then deemed to have demonstrated his capacity for academic achievement. Two points should be made explicit. First, as noted, there was no advantage to having higher grades than the minimum. Second, the specific subjects in which the high grades had been achieved were not considered. High grades in Bible and English were as esteemed as high grades in biology and mathematics.

In the Israeli context, this decision marks a radical policy change. It immediately broadens the potential applicant pool to candidates who would otherwise not even apply to Medical School. On the other hand, there is no doubt that this includes some who are not qualified enough academically for Medical School. On the other hand, however, it brings to the pool candidates who may be very desirable: minority group members whose secondary schools were bad; youngsters whose interests, commitments and problems led them to focus on matters other than grades in secondary school (including activities in matters of social significance); those whose interest in a professional career matured slowly. The policy decision is based on the assumption that given a Medical School environment which is adequately motivating and facilitating, students will reasonably moderate secondary school grades will be able to cope successfully academically.

The second requirement for registration refers to age. Given a selection procedure which is based on far more than academic achievement, and a curriculum which includes clinical training and responsibility from the beginning, we felt that candidates whose total life experience was largely limited to the school desk were not for us. The minimum age for registration was set as 20 at the time of enrollment.

Stage B. Entrance examination

Extensive data indicate that subject examination grades and scores on intelligence tests are very far from highly correlated. At this stage, registered candidates took a non-verbal intelligence test without any additional weight being given for higher scores. The cutoff point was determined by the predetermined number of personal interviews which could be conducted (c. 300; some 6% of those examined moved on to Stage C).

Stage C. Personal interview

There is no doubt that this stage was the crucial one. Candidates reaching this stage were deemed to have provided evidence that their academic and intelligence capacities were quite adequate for them to make good doctors. Neither their matriculation grades nor intelligence test scores were available to interviewers. Here the focus was on the personality and value characteristics of the candidate, and the experiences which had shaped them and, of even greater importance, through which they had been expressed.

The pitfalls of interviewing are well known, its reliability and validity being very low. We sought to avoid them in a number of ways. Probably the most decisive way was the common language which had been achieved, first, but the very selection of Committee members (see below) and second, in the course of the lengthy discussions held in which the goals of the school and the appropriate characteristics of desirable candidates were hammered out. This common language came to full expression in the extensive training session which preceded the interviews.

In the first year, the formal Committee, which had formulated the selection procedure, consisted of ten members, to whom another ten were added to serve as interviewers. We realized only too late how valuable the earlier discussions had been in developing a common language, and how much they had contributed to the commitment of Committee members to the task. This led, in the second and third years, to the inclusion of all those involved in interviewing as formal members of the Committee.

The interviews were conducted by ten two-person teams. At the conclusion of the interview, each interviewer tentatively arrived at a rating of from a high of 1 to 5, which ratings were then discussed by the team. (In practice, all interviewers used a 9-point scale: 1-5, etc.) Although this procedure undoubtedly had an impact upon independent judgment, in both years discussions of the Committee affirmed this procedure. It was felt that this impact was more than made up for by the ability of one to remind the other of something which he might have forgotten or missed. In the first year, only a global assessment was made. In the second year, interviewers were asked to give evaluations as well as record specifics with regard to eight of the sixteen characteristics. The major purpose of this was to facilitate recollection of the candidate in Stage D, the stage of final decision.

Stage D. Final selection

In the first year, some three times the number of candidates who could be accepted received interview evaluation of 2-2 or higher (i.e. each interviewer gave a ranking of 'reasonable to accept' or 'definitely acceptable'). Each of these candidates had been interviewed by one member of the Committee. Each member then ranked his 'own' candidates and, having the full set of data (grades, scores, documents), each of us in turn presented first our best, then our second best, and so on, candidate. In the first round, though serious discussion about each candidate took place, all were accepted. Subsequent rounds generated enthusiasm in some cases, mild questions in others. Through this

procedure, a group of thirty-four candidates about whom consensus had developed was accepted. These persons were not ranked. A second group of twenty, who had been presented but about whom some question had been raised, were defined as a reserve, and ranked by an equally weighted average of matriculation grades and intelligence test scores.

7.2. Community ambulatory teaching clinics [2]

The need for establishing ambulatory teaching clinics was recognized at the time the Medical School was founded in 1974. This need relates to the two goals which distinguish the Medical School in Beersheva from the others in Israel. The first is to utilize the academic establishment as a means to develop and implement changes in the health care system of the Negev region. The second is to attract medical students to the field of primary care, and to provide them with the professional skills needed in this branch of medicine.

The role of the primary care teaching clinics is to provide community-based academic counterparts to the clinical facilities of the teaching hospitals. They will serve as sites for experimenting with new patterns for delivering health care and provide settings with appropriate role models for undergraduate and graduate education. Each clinic will have considerable autonomy in determining the manner in which health services are delivered and in matters related to internal organization and relationships with other components of the health care system. Procedures are being designed to evaluate both the process of providing services and the outcomes in terms of the health status of the population served. There is one important constraint. The ordinary operating budget of the teaching clinic will be similar to that of a regular clinic serving an equivalent population base. It is anticipated that this will increase the probability that measures introduced in the teaching clinics and found to be successful can be replicated throughout the Negev region.

Hospital-based physicians will provide consultative services to the clinics and the primary care practitioners will assume appropriate responsibilities for the care of their patients who are hospitalized. This linkage between hospital and community will provide a mechanism by which the primary care dimensions of medical practice can be taught effectively. During the hospital-based portion of the clerkships students will participate in consultative services provided to the clinics. They will also have opportunities to follow patients, who, after discharge from the hospital, return to the clinics for continuing care. As part of the primary care clerkship students will take part in the service and research activities of the teaching clinics. This includes following clinic patients during periods of hospitalization.

Following a decision by Kupat Cholim to explore the feasibility of establishing ambulatory teaching clinics, two conferences were held to identify a range of options which should be considered. The first conference was held in Beersheva in March, 1976. Among the participants were family physicians from all parts of Israel and three members of the Department of Family Practice, University of South Carolina. The second conference was held

in Boston with the participation of faculty of Harvard Medical School and Harvard School of Public Health as well as representatives of the Ben Gurion University of the Negev.

The first primary care teaching clinic was opened in the winter of 1976-77. It is anticipated that additional clinics will be established as appropriate personnel and facilities become available. The manner in which these clinics evolve will be a major determinant of whether graduates of the Medical School will be attracted to primary care careers in the Negev. To this end, the clinics should enable the physician to practice comprehensive medicine of a high quality, provide opportunities for research in primary care and facilitate interaction with other components of the health care system. As these conditions are attained in the teaching clinics they will be replicated throughout the network of primary care settings in the region.

The policy guide for the establishment for the first ambulatory teaching clinic is shown on the following pages.

7.3. Learning Resources Center

A Learning Resources Center was established in 1974 and has functioned continuously since that time. The Center seeks to provide a responsive environment which would enable students to acquire learning experiences which are not part of the formal program of instruction. These include the following categories of activities:

1) Review of areas covered in the formal courses with opportunities for remedial intervention. Examples include review or revision of laboratory exercises and practice sessions for clinical skills taught as part of formal clinical courses.

2) Remedial intervention. For students who have missed sections of courses or who are experiencing difficulties, the learning resources center provides a setting for individual tutoring, small group sessions and other similar activities as part of the overall system for remedial intervention.

3) Exploration of new areas. Students are encouraged to utilize the facilities of the learning resource center to explore new avenues of interest outside the scope of formal courses. This may be done on an individual basis or in small groups.

4) Opportunities for teachers to experiment with innovative teaching methods. Teachers could use the facilities of the learning resources center to offer elective instruction utilizing innovative teaching methods.

Equipment and instructional software is concentrated in space designated for this purpose. Additional facilities may be mobilized on an ad hoc basis in other parts of the Medical School, university, hospital and clinics.

Members of the regular teaching staff and appropriate guests advise individual students, provide guidance for groups working on projects and participate in special presentations, demonstrations and seminars. It is anticipated that the scope of the center and the range of its activities will increase as the full complement of the six year curriculum is reached.

Utilization of the learning resources center has been very variable. Demands of the formal curriculum have in general tended to leave little time for students to explore the potential of the Center. This is particularly true for the first cohort of students. There is a marked tendency to "overshoot" the first time a course is taught. By the second or third trail the demand on students is considerably reduced as teachers are better able to distinguish between essential and recommended components of course content. Hence the third cohort of students had more curricular flexibility and thus more opportunity to use the learning resource center.

An example of programming of the learning resources center is shown on the following pages.

7.4. System of Remedial Intervention

In the light of the process for selection of students (see Section 7.1) which led to considerable heterogeneity of the student body in terms of academic background and the intensive nature of the curriculum (see Section 4.2) the need for carefully monitoring student progress and providing opportunities for remedial learning became evident early in the first year of the Medical School's experience. Monitoring of student progress was assured through the system of formative evaluation with its progress and post-tests. Providing remedial intervention has, however, proven to be a difficult task in view of the shortage of teachers. The problem was recognized by both faculty and students. Efforts were made in 1975 and 1976 to assign students to specific teachers for purposes of tutorial guidance. This approach was only partially successful as most teachers were unable to allocate the necessary time.

In 1977 a new initiative was taken under the direction of the Curriculum Development Unit. With four classes of the Medical School comprising some 150 persons, it was possible to identify potential tutors in a number of subject areas from among the students themselves. Many came to medical studies with a background in the basic sciences. Others showed particular aptitude in certain areas. It then was feasible for these "advances" tutors to serve as tutors for students experiencing difficulties in particular subject areas. Under these conditions it was feasible to establish and implement a system of remedial intervention which could be viable since it drew on student as well as faculty resources.

The initiative was taken by the students themselves and has met with very favorable response from the faculty. During the summer of 1977, an administrative framework was created. At the time of writing of this report, it is still too early to assess the merits of this new approach. It does,

however, suggest that the students have internalised the fundamental principles upon which the Medical School was founded and are prepared to play an active role in their implementation.

REFERENCES

1) The admissions process is described in detail in:
Student Selection in the School of Medicine,
Ben Gurion University of the Negev - A Case Study;
Association for Medical Education in Europe:
Dundee : 1976

2) See

Interim Report II; page 298

First Quarter Interim Report:
Year 03; page 10

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HIGHLIGHTS

8. Summary and Recommendations

Summary

- On June 30, 1977, Contract No. NO1-PE-44163 between the Bureau of Health Manpower an the Center for Educational Development in Health, formerly at the Harvard School of Public Health and now located at Boston University Medical Center was completed. The purpose of the contract was to provide support for a *collaborative project in health manpower development* involving the Center and the Faculty of Health Sciences, Ben Gurion University of the Negev.

- The project was initially designed to *field test the CEDH curriculum development model* in a setting which emphasized the training of primary care physicians for service roles in an underserved area. The frontier mentality which characterized both the new Medical School and many aspects of life in Beersheva offers a unique opportunity to test an innovative curriculum, free of the constraints of tradition found in many other Medical Schools.

- The problems associated with such a curriculum are similar to those which face medical educators in this country. However, circumstances under which the experiment in Beersheva is being conducted afford an opportunity not easily duplicated in the United States to develop innovative approaches to the solution of these problems. It is an underlying premise of the Project that *certain of the solutions generated in Beersheva will be adaptable to American Medical Schools.*

- The scope of the project has encompassed three objectives.

    1) To field test the Teacher Preparation Program model for systematic curriculum design.

    2) To design, conduct and evaluate a Faculty Teaching Laboratory.

    3) To establish and maintain a collaborative relationship.

- Progress in achieving these three objectives has been described in some detail in this final report and in successive annual reports submitted under the terms of this contract. The initial expectations as described above have been met. *The Teacher Preparation Program model has been followed from the initial stages of the curriculum development process* at the Ben Gurion University of the Negev Medical School. This has been the first opportunity to test the model in a setting which emphasizes the training of primary care physicians and embraces both an underserved region in general and certain disadvantaged groups in particular. The procedures which comprise the model were applied in the planning implementation phases of all subject areas. The modifications, adaptations and revisions which emerged from this experience have been incorporated into the various instructional activities of the Center.

- A Faculty Teaching Laboratory was established to provide opportunities for faculty development. Teacher training has been offered both in formal courses and through in-service consultation and courses. *Experience gained in Beersheva has had a significant impact on the teaching activities of the Center for Educational Development in Health.* Programs for faculty development in health professions schools in the United States in which the Center participates have been modified on the basis of the experience gained in Beersheva.

- A *close collaborative relationship* has been established between the Center and the Medical School in Beersheva. Exchange of staff and students has taken place resulting in the enrichment of programs in both institutions. In addition, the Beersheva experiment in medical education has attracted interest among numerous medical educators and health professions schools in the United States.

2. Implication for medical education in the United States

- In the area of curriculum organization and sequencing
  - a *spiral model* of curriculum organization (Section
  - a high degree of *integration* and *co-ordination* throughout the curriculum (Section
  - emphasis on the development of competencies in *self-education, problem-solving* and *interdisciplinary thinking*
  - provision of clinical training based on the *natural history of disease* spectrum
- The *evaluation system* being developed is more coherent and rational than is currently the case in many Medical Schools
- The approach to *student selection* in its attempt to select candidates who have a high probability of opting for careers in primary care
- Three distinctive instructional resources
  - units of instruction
  - a learning resources center
  - primary care teaching clinics
- An effective *faculty teaching laboratory*

3. Recommendations

- In the light of the successful conclusion of Contract No. NO1-PE-44163 and in the increasing potential for experience gained in the Beersheva experiment to have an impact on medical education in the United States, it is recommended that the collaboration between the Center for Educational Development in Health and the Faculty of Health Sciences at the

Ben Gurion University of the Negev be continued. The purpose of such collaboration would encompass the following objectives:

1) To *identify* components of the Beersheva medical curriculum which can be adapted to meet the needs of medical education in the United States.

2) To *develop* materials related to these components in formats which will facilitate their utilization in the United States.

3) To *disseminate* the results of the Beersheva experience, in part through these materials, among American medical educators.

8. Summary and Recommendations

8.1 Background

On June 30, 1977 Contract No. NO1-PE-44163 between the Bureau of Health Manpower and the Center for Educational Development in Health, formerly at the Harvard School of Public Health and now located at Boston University Medical Center was completed. The purpose of the contract was to provide support for a collaborative project in health manpower development involving the Center and the Faculty of Health Sciences, Ben Gurion University of the Negev.

The project was initially designed to field test the CEDH curriculum development model in a setting which emphasized the training of primary care physicians for service roles in an underserved area. The frontier mentality which characterized both the new Medical School and many aspects of life in Beersheva offers a unique opportunity to test an innovative curriculum, free of the constraints of tradition found in many other Medical Schools.

The problems associated with such a curriculum are similar to those which face medical educators in this country. However, circumstances under which the experiment in Beersheva is being conducted afford an opportunity not easily duplicated in the United States to develop innovative approaches to the solution of these problems. It is an underlying premise of the Project that certain of the solutions generated in Beersheva will be adaptable to American Medical Schools.

The scope of the project has encompassed three objectives.

1) To field test the Teacher Preparation Program model for systematic curriculum design.

2) To design, conduct and evaluate a Faculty Teaching Laboratory.

3) To establish and maintain a collaborative relationship.

Progress in achieving these three objectives has been described in some detail in this final report and in successive annual reports submitted under the terms of this contract. The initial expectations as described above have been met. *The Teacher Preparation Program model has been followed from the initial stages of the curriculum development process* at the Ben Gurion University of the Negev Medical School. This has been the first opportunity to test the model in a setting which emphasizes the training of primary care physicians and embraces both an underserved region in general and certain disadvantaged groups in particular. The procedures which comprise the model were applied in the planning implementation phases of all subject areas. The modifications, adaptations and revisions which emerged from this experience have been incorporated into the various instructional activities of the Center.

A Faculty Teaching Laboratory was established to provide opportunities for faculty development. Teacher training has been offered both in formal courses and

through in-service consultation and courses. *Experience gained in Beersheva has had a significant impact on the teaching activities of the Center for Educational Development in Health.* Programs for faculty development in health professions schools in the United States in which the Center participates have been modified on the basis of the experience gained in Beersheva.

A *close collaborative relationship* has been established between the Center and the Medical School in Beersheva. Exchange of staff and students has taken place resulting in the enrichment of programs in both institutions. In addition, the Beersheva experiment in medical education has attracted interest among numerous medical educators and health professions schools in the United States.

The Beersheva experiment has reached the half-way mark. In three years, the full six year program will have been developed and implemented. This final report describes the background and goals of the Medical School and what has been accomplished since it was established in 1974. At that time, a Medical School in Beersheva which would have as its special mission the training of primary care physicians was more a dream than reality. Today, approximately 150 students are being trained in a unique environment - one in which medical education is structured within the context of an entire health delivery system.

In the first three years of this contract, the educational program at the Medical School in Beersheva has acquired both direction and momentum. Consistently, the direction has been responsive to the goal of training a new type of physician. This is reflected in all aspects of the curriculum. The momentum, in turn, has in large measure been a result of the direction which the School has taken. The high level of commitment among faculty and students would have been unlikely in the absence of a challenge such as that posed by the innovative approach to medical education. The question at this point is whether the approach can be sustained as the novelty recedes.

Several considerations suggest that this may be the case, at least over the short term. The curriculum for the first two phases has proven to be fairly stable. It appears to have met the expectations of both teachers and students. Changes which have been recommended have been relatively minor and relate more to improving the quality of instruction than to altering the basic approach. Consonance between the system of evaluation and the process of instruction and the clear relationship of both to the educational goals of the Medical School have probably been important factors in achieving this stability.

The integrated organ system modules and the clinical clerkships are being developed, for the most part, by teachers with experience in designing and implementing earlier portions of the curriculum. This experience tends to reinforce commitment to the basic educational orientation of the School. As a consequence, continuity of approach is clearly evident in those parts of Phase III which have been developed until now.

The readiness of faculty, students and administrators to continue in the direction which was charted three years ago is not in doubt. Their ability to do so, however, will be conditioned by constraints in the Beersheva situation. Some are beyond the control of the Medical School and will be determined by political, economic and social developments in the country as a whole.

Others, of a more local nature, include the direction in which health services in the Negev will evolve. Achievement of the educational goals of the Medical School was predicated from the outset, on simultaneous progress in improving the system for delivering health care in the Negev. This interdependence is manifest in the quantity and quality of physicians available for teaching, and in the academic standards of settings in which instruction takes place.

8.2 Implications for medical education in the United States

Many of the issues which are faced in training highly qualified physicians who will practice primary care in a disadvantaged region in Israel are similar to those encountered by American medical educators. As the outcomes at Beersheva are evaluated over the next three years, solutions which were initially specific to Israel may prove to have broad application to the training of health manpower in the United States.

In the area of *curriculum organization* and *sequencing* (see Section 4) certain innovations may have domestic applications:

-- Curriculum organization along a spiral model rather than by layers with sciences, clinical studies and community medicine starting in the first year and continuing throughout the six year program

-- Stress on integration and coordination throughout the curriculum in the teaching of the basic sciences, the clinical program and community medicine

-- Emphasis on the development of competencies in problem-solving and interdisciplinary thinking, which form the basis for an integrative final examination at the end of each year

-- Provision of clinical experience for students from the first year of studies in many different settings which relate one to the other so that the students experience the problems of providing for continuity of medical care

-- Adaptation of the integrated organ system approach and its articulation with the clerkship program in such a way as to facilitate learning and encourage patterns of self-education.

The *evaluation system* (see Section 6) being developed in Beersheva represents a more coherent and rational system than is currently in operation in many Medical Schools. While more data is necessary, the outcome of this vital area in curriculum design may well be adaptable to the needs of Medical Schools in the United States.

The approach to student selection (see Section 7) in Beersheva with its attempt to identify students who have a high probability of opting for careers in primary care may have implications for Medical Schools in the United States. Intellectual capabilities are evaluated on a threshold basis, and a high weight is assigned to

character assessment by representatives from both the medical profession and the community at large. This approach requires further validation in terms of student academic performance and ultimate career choice. In the interim, however, Medical Schools in the United States may wish to consider utilizing some of the admission procedures developed in Beersheva.

Provisions of opportunities for *clinical studies* in a wide range of health care facilities rather than exclusively within the confines of the hospital is a hallmark of the program of studies in Beersheva. These include carefully structured learning experiences in urban and rural ambulatory care centers, inpatient and outpatient hospital departments and community-based facilities for early detection of disease, mental health services, pediatric and geriatric care, occupational health and rehabilitation. Ways in which these experiences can be integrated to provide a more balanced approach to prevention, therapy and rehabilitation are being developed. Use of the natural history of disease model as a theme common to teaching in all clinical settings is proving quite effective in this regard. This approach has also helped bridge the traditional gap between clinical instruction and the teaching of public health. A number of Medical Schools in the United States have already indicated considerable interest in adapting this aspect of the Beersheva curriculum to their own needs.

Of perhaps a less tangible nature than the "outcomes" described thus far is the *process* of curriculum development which has evolved in Beersheva (see Section 3). The need to secure the active co-operation of basic scientists and clinicians who were unfamiliar with the basic approach has resulted in the elaboration of patterns of governance designed to facilitate the adoption of innovative educational methods without alienating the more conservative members of the faculty. The lessons learned in Beersheva have implications for American Medical Schools in which efforts are being made to introduce significant changes oriented towards primary care training in the curriculum.

Of particular significance in terms of domestic application are *three distinctive instructional resources* to which the nature of the curriculum in Beersheva has given rise; a compilation of units of instruction covering virtually all segments of the curriculum, a learning resources center which provides a responsive environment for student initiated learning activities and the first of a network of primary care teaching clinics.

A substantial part of the teaching is based on *units of instruction* (see Section 7). These follow a standard format which consists of three components. The first sets the boundaries of the unit. General subject area and topics to be considered are specified and the required pre-requisites are listed. These are followed by a set of key words and guidance questions related to each of the topics. Questions are classified according to cognitive level from recall to problem-solving. Those which are recommended for elective study only are so indicated. Skills to be acquired as part of the unit, such as laboratory techniques or clinical procedures are stated in behavioral terms.

The second component describes the methods of teaching and evaluation to be used in the unit. It comprises directives for independent study, a description of in-class activities and a specification of the conditions of evaluation and expected student performance. A third component consists of suggested readings. A list of pertinent bibliographic resources is provided which together with the guidance questions communicates the anticipated scope of depth learning.

The units of instruction serve several purposes. Firstly, by understanding what is expected, students are able to organize their learning activities in a rational manner. The distinction between core competencies which are required and area in which elective study is encouraged provides guidance to students in setting priorities for allocation of effort. The communication of instructional objectives in operational terms also provides students with a frame of reference which encourages independent study and facilitates the process of student self-assessment. Secondly, the units of instruction establish a basis for student and teacher accountability which is not arbitrary. Test items for inclusion in intermediary tests, post-tests and certifying examinations are based on proto-types which appear in the units of instruction. The units are also used by joint faculty-student review committees to evaluate the quality of instruction in terms of the objectives to be attained.

A third function of the units of instruction is to facilitate horizontal and vertical integration. The flexibility of format enables an individual unit to be prepared and taught conjointly by instructors from several disciplines. The development of units of instruction for introductory courses is guided by pre-requisites set for advanced courses. In this way redundancy can be avoided while ensuring the adequacy of student preparation for entry into courses at successive levels of sophistication.

Development of units of instruction proceeds through a process of successive approximations. In some subject areas they adhere to the format described above. In others, they are more primitive and require additional revision. The eventual goal is to produce *instructional learning packages*. The learning package is an extension of the unit of instruction to include appropriate learning materials in a variety of media. It can be used either in a free-standing independent modality or as part of a course.

The *learning resources center* (see Section 7) is designed to encourage independent learning by providing an environment which is responsive to student initiative. In this role it complements the bibliographic resources available through the library. The center may be used for remedial study, to extend learning beyond the limits set by course objectives and to explore new fields of interest. Students may conduct laboratory activities, arrange demonstrations, review audiovisual materials, practice clinical skills or initiate other types of learning activities.

Equipment and instructional software is concentrated in space designated for this purpose. Additional facilities may be mobilized on an ad hoc basis in other parts of the Medical School, university, hospital and clinics. Members of the regular teaching staff and appropriate guests advise individual students, provide guidance for groups working on projects and participate in special presentations, demonstrations and seminars. It is anticipated that the scope of the center and the range of its activities will increase as the full complement of the six year curriculum is reached.

The role of the *primary care teaching clinics* (see Section 7) is to provide community-based academic counterparts to the clinical facilities of the teaching hospitals. They will serve as sites for experimenting with new patterns for delivering health care and provide settings with appropriate role models for undergraduate and graduate education. Each clinic will have

considerable autonomy in determining the manner in which health services are delivered and in matters related to internal organization and relationships with other components of the health care system. Procedures are being designed to evaluate both the process of providing services and the outcomes in terms of the health status of the population served. There is one important constraint. The ordinary operating budget for a teaching clinic will be similar to that of a regular clinic serving an equivalent population base. It is anticipated that this will increase the probability that measures introduced in the teaching clinics and found to be successful can be replicated throughout the Negev region.

Hospital-based physicians will provide consultative services to the clinics and the primary care practitioners will assume appropriate responsibilities for the care of their patients who are hospitalized. This linkage between hospital and community will provide a mechanism by which the primary care dimensions of medical practice can be taught effectively. During the hospital-based portion of the clerkships students will participate in consultative services provided to the clinics. They will also have opportunities to follow patients who, after discharge from the hospital, return to the clinics for continuing care. As part of the primary care clerkship students will take part in the service and research activities of the teaching clinics. This includes following clinic patients during periods of hospitalization.

It is postulated that continued development of the elements discussed above which are characteristic of the curriculum in Beersheva will yield results which can find effective application in American medical education.

8.3. Dissemination of results among American medical educators

If the potential applications of the Beersheva experience are to be realized they must be communicated to medical educators in this country. *This communication has taken several forms.* The first is through visiting faculty and students from the United States. In year 01, there were twelve visiting faculty from the United States; in year 02, twenty-nine faculty and in year 03 faculty from American Medical Schools visited the Ben Gurion Health Sciences Center, and participated in various projects.

A second way of disseminating information generated at Beersheva has been through the activities of the Center for Educational Development in Health. Experience gained at Beersheva is being incorporated into the teaching materials of the Center. Examples of the Center's activities in which these materials have been used include the ongoing teacher training program in which faculty from Medical Schools across the country participate; a collaborative project with the Association of Teachers of Preventive Medicine to develop curriculum in preventive medicine for American Medical Schools (1975-); and a regional Conference on Health Manpower Development for Underserved Areas of New England (1976).

A third method of dissemination will be through an Academic Liaison Committee currently being organized. It is anticipated that the American Liaison Committee will include faculty from Medical Schools in all regions

of the United States, and will cover a broad range of disciplines.

8.4. Recommendations

In the light of the successful conclusion of Contract No. NO1-PE-44163 and the increasing potential for experience gained in the Beersheva experiment to have an impact on medical education in the United States, it is recommended that the collaboration between the Center for Educational Development in Health and the Faculty of Health Sciences at the Ben Gurion University of the Negev be continued. The purpose of such collaboration would encompass the following objectives:

1) To *identify* components of the Beersheva medical curriculum which can be adapted to meet the needs of medical education in the United States.

2) To *develop* materials related to these components in formats which will facilitate their utilization in the United States.

3) To *disseminate* the results of the Beersheva experience, in part through these materials, among American medical educators.

These objectives build on the experience acquired under contract NO1-PE-44163. They differ, however, in orientation. They relate solely to steps which can *facilitate communication* of the results from the Beersheva experiment to American medical educators.

Outputs under this continuing collaboration will be of two types. The first consists of materials which are designed *specifically* for use in Medical Schools in the United States. The second provides a delivery system whereby maximum *dissemination* of these materials can be achieved.

1. To identify components of the Beersheva medical curriculum which can be adapted to meet the needs of medical education in the United States.

   The following aspects of the program would be reviewed in association with a panel of American medical educators to determine which components are of particular relevance to medical education in the United States.

   a) <u>The curriculum development process</u>: general approach, specific procedures, organization, governance, institutionalization of opportunities for change, mechanisms for ensuring incorporation of the primary care dimension of medical practice, developing competency-based objectives based on analysis of physician performance and the successive approximation approach to curriculum development.

   b) <u>Specific aspects of the curriculum</u>: components related to primary care in basic science and clinical subject areas, use of the natural history of disease concept as an integrative theme, program for early introduction of competency-based clinical teaching, longitudinal integration of instruction in community-medicine over the six year curriculum, ways of achieving horizontal and vertical inte-

gration in the teaching of basic sciences, clinical medicine and public health, integrating hospital-based teaching with learning experiences in a variety of health care facilities in the community and the primary care dimensions of clinical clerkships in all fields.

c) Instructional methods, facilities and materials: use of the primary care teaching clinic as an academic community-based counterpart to teaching facilities in hospitals, the function of a learning resources center in encouraging student initiatives for learning, development and use of units of instruction and learning packages to provide a framework for learning, methods for modification of teaching to attain an emphasis on problem-solving and methods for faculty development.

d) Methods of evaluation: development of integrative examinations, design of evaluation instruments to measure achievement of competency-based objectives, evaluation of competencies in primary care, use of formative evaluation to encourage self-learning, methods of evaluation in competency-based clerkships, evaluation of the instructional process and long-term evaluation of the impact of medical studies.

This is a *partial* list of aspects of the program of medical studies which may have implications for medical education in the United States. It is anticipated that others would emerge during the next three years as a full complement of a six year curriculum is attained in Beersheva.

2. To develop materials related to these components in formats which will facilitate their utilization in the United States.

Once these components have been identified, related materials would be prepared to facilitate application within the context of American Medical Schools. The formats may include:

a) Manuals of organization and procedure.

b) Proto-types of instructional materials with appropriate examples.

c) Descriptive summaries and reports.

d) Articles for journals in medical education.

e) Presentations at appropriate conferences and meetings.

Formating the materials will require editing, modifying and translating. The resulting products would be produced in sufficient quantity to ensure their accessibility to interested Medical Schools in the United States.

3. To disseminate the results of the Beersheva experience, in part, through these materials, among American medical educators.

Communication of the Beersheva experience through materials developed under objective 2 would take several forms:

a) Visits by faculty of American Medical Schools in Beersheva. Direct contact of American medical educators with the program in Beersheva represents a most effective channel of communication. Precedents set during the first three years and described earlier in this report should be continued and expanded.

b) Student exchange programs with American Medical Schools. Several such programs are currently being developed. They will expand student contacts which until now have been arranged informally.

c) An Academic Liaison Committee of American medical educators should be established. First steps in this direction have been taken. The American Liaison Committee would:

1. serve as a channel of communication for the sharing of the Beersheva experience in medical education with schools in the United States.

2. recommend and arrange bilateral or multilateral projects involving the participation of the Ben Gurion University of the Negev Medical School.

3. facilitate exchange programs for faculty and students.

   a. serve as a clearing-house for the dissemination of instructional materials developed in Beersheva to interested Medical Schools in the United States.

The composition of the Liaison Committee would include medical educators in a variety of fields. The administrative infrastructure for the establishment of the Committee is currently being created.

d) Professional publications and presentations.

e) Findings from the Beersheva experiment will be published in the appropriate literature and will be presented at meetings of American medical educators.

APPENDIX I

Guidance System for the

Center for Educational Development in Health

Model for Systematic Course Design

This guidance system delineates the elements and the sequencing of the CEDH model which was used as the basis for curriculum development and for faculty training at the Faculty of Health Sciences, Ben Gurion University of the Negev.

Chapter 10
GUIDANCE SYSTEM

The complete Guidance System is compiled here as one continuous unit. The Guidance System summarizes each major task described in Unit A, to serve as a checklist or guide when designing a course.

PHASE 1: DESCRIBING PROFESSIONAL PERFORMANCE

Task 1: Describe Optimal Professional Performance

STEPS	PROCEDURES	PRODUCTS
1. Identify the future professional roles of the students.	a. Indicate the future positions or titles to be assumed by students and for which training is designed. b. If future roles are widely divergent or unknown, review Problem 1 beginning on page B-6.	A phrase describing the future role(s) of the students, including information about the setting or environment in which they will practice.
2. List professional responsibilities associated with the future roles.	a. Identify the activities, duties or tasks of competent practitioners in the role(s) identified. Each activity should: – represent optimal professional performance, and – be related to the scope and purpose of the course. b. If you have difficulty with this step, consult Problems 2 and 3 in Unit B, beginning on page B-12.	A list of responsibilities for each role, organized sequentially and/or by meaningful categories.
3. Analyze the skill, knowledge, and attitude components of each responsibility.	For each responsibility: a. identify the *skills* or steps required to execute that responsibility, b. list information the practitioner must *know* or be aware of to execute a skill component or the responsibility as a whole, and c. indicate *attitudes* practitioners should have towards others, themselves, or their work to facilitate execution of a skill component or the responsibility as a whole. If you have difficulty with this step, consult Problems 4 and 5 in Unit B, beginning on page B-36.	*Initial mastery description – The complete set of professional responsibilities analyzed in terms of skill, knowledge, and attitude components. The following page shows alternative formats for these analyzed responsibilities.

*Needed in subsequent steps of the course design model.

SUGGESTED FORMATS

For Each Analyzed Responsibility in the Mastery Description

Course Title: _____

ANALYZED RESPONSIBILITY

Responsibility No. : _____

SKILLS	KNOWLEDGE	ATTITUDES
1. _____	_____	_____
2. _____	_____	_____
3. _____	_____	_____

OR

Course Title: _____

ANALYZED RESPONSIBILITY

Responsibility No. : _____

A. SKILLS
1. _____
2. _____
3. _____

B. KNOWLEDGE
1. _____
2. _____
3. _____

C. ATTITUDES
1. _____
2. _____

PHASE 1: DESCRIBING PROFESSIONAL PERFORMANCE

Task 2: Analyze Actual Professional Performance

STEPS	PROCEDURES	PRODUCTS
1. Select and implement method(s) of performance analysis.	a. Review methods of performance analysis in Chapter 7, beginning on page C-3 and guidelines for selection on page B-55. b. Consider feasibility of implementation in view of constraints such as the availability of: – time – money – practitioners or other subject matter experts, and – resources needed to analyze data. c. Plan and carry out performance analysis.	Instruments used in the performance analysis, such as: – questionnaires – checklists – questions for interviews – audio tapes for recording technical conferences
2. Identify performance discrepancies.	a. Compare findings of performance analysis with initial mastery description. b. Look for: – responsibilities or components specified in initial mastery description which in actual practice are • performed differently • not performed well, or • not performed at all. – responsibilities or components which are performed in actual practice but were omitted from initial mastery description.	*List of performance discrepancies.

*Needed in subsequent steps of the course design model.

GUIDANCE SYSTEM

PHASE 1: DESCRIBING PROFESSIONAL PERFORMANCE

Task 3: Revise the Initial Description of Performance

STEPS	PROCEDURES	PRODUCTS
1. Analyze causes of performance discrepancies.	Determine to what extent each discrepancy can be attributed to: – skill/knowledge factors – attitudinal factors – environmental factors.	Explanations for each performance discrepancy.
2. Modify initial mastery description.	If a discrepancy is attributed primarily to: → Then consider: Skill/knowledge factors → Adding or emphasizing a responsibility or appropriate skill/knowledge components. Attitudinal factors → Adding or emphasizing an attitude component to appropriate responsibilities. Environmental factors → Discarding the responsibility or component, or Retaining the responsibility but adding environmental constraints as knowledge components.	*Revised mastery description, which may be either – the initial mastery description which has been changed by additions, subtractions, and modifications, or – a totally new mastery description

*Needed in subsequent steps of the course design model.

PHASE 2: DESCRIBING STUDENT COMPETENCIES

STEPS	PROCEDURES	PRODUCTS
1. Describe professional conditions performance.	For each responsibility for which instruction is to be planned, summarize: a. typical conditions under which the responsibility is executed in the professional setting, and b. the performance of a competent practitioner discharging the responsibility under those conditions.	Descriptions of the professional competencies associated with each responsibility to be taught.
2. Plan simulation of the professional conditions and performance.	Determine feasible and assessible conditions and performance that most closely approximate the professional conditions and performance. Take into consideration: a. the entry competencies of the students, b. resources available for simulation, and c. needs for formal evaluation (i.e., posttests, pretests, and/or prerequisite tests). If you have difficulty with this step, consult Problems 9 to 11 in Unit B beginning on page B-70. Also, consult Chapter 8 in Unit C for details on specific evaluation techniques and related issues (page C-29).	*Descriptions of *entry* and terminal student competencies for each professional competency. The following page shows a suggested format for displaying these competencies.

*Needed in subsequent steps of the course design model.

SUGGESTED FORMAT

For Describing Student Competencies

Course Title: _____

PROFESSIONAL, TERMINAL, AND ENTRY COMPETENCIES

Responsibility No. : _____

CONDITIONS	PERFORMANCE
Professional Competency: When given _____ . . .	. . . . practitioners _____ .
Terminal Student Competency: When given _____ . . .	. . . students will _____ .
Entry Student Competencies: When given: . . . (a) . . . _____ . . . (b) . . . _____ . . .	Students will . . . . . . _____ . . . _____

PHASE 3: PLANNING STUDENT LEARNING

TASKS	PROCEDURES	PRODUCTS
1. Define intermediate competencies.	For each unit of instruction, specify the conditions and performance of intermediate levels of simulation for assessing student progress and providing feedback. That is, for each responsibility, determine: a. at what intermediate levels of simulation it is desirable and feasible to check student's mastery of the entire responsibility, and b. which skill, knowledge, and/or attitude components should be mastered before higher levels of simulation are attempted. For additional guidelines, see page B-100 (Problem 12 in Unit B).	Descriptions of the intermediate competencies for each terminal competency. That is, statements of the conditions and performance for intermediate levels of simulation above that of entry, and below that of the terminal competency. See following page for suggested format.
2. Design instructional activities.	a. For each unit of instruction, put intermediate competencies in an approximate sequence for instruction. b. For each intermediate competency, determine what instructional functions are needed to facilitate student progress from entry to termination. c. Plan activities to serve appropriate instructional functions, making sure all relevant skill, knowledge, and attitudes are covered. d. If needed, review methods and media in Chapter 9 (page C-54) and guidelines for Problems 13 and 14 in Unit B (pages B-113 and B-130).	Descriptions of instructional activities for each intermediate (and terminal) competency. Should be organized into "units of instruction." See following page for suggested format.
3. Develop course syllabus.	a. Determine final sequence for units of instruction and activities within units. b. Plan activities for continuity between units. c. Identify "assignments" to be done outside the instructional setting. d. Combine and structure in-class and out-of-class activities into the time-frame allotted for the course. e. See page B-137 (Problem 15) for additional guidelines.	Course syllabus. The following page shows a suggested format for the course syllabus.

SUGGESTED FORMATS

Course Title: _____

INTERMEDIATE COMPETENCIES

Responsibility No. : _____

CONDITIONS When given . . .	PERFORMANCE Students will . . .
(Regarding Entire Responsibility:) 1. . . . _____ . . . 2. . . . _____ . . .	. . . _____ . . . _____
(Regarding Initiated Components:) 3. . . . _____ . . . 4. . . . _____ . . . 5. . . . _____ . . . . . . _____ . . .	. . . _____ . . . _____ . . _____

Course Title: _____

INSTRUCTIONAL UNIT

Responsibility No. : _____

COMPETENCIES	INSTRUCTIONAL ACTIVITIES
(Introduction to unit)	_____ _____
IC No. -	_____ _____ _____
IC No. -	_____ _____ _____
Terminal	_____ _____ _____

SUGGESTED FORMATS, CONTINUED

SYLLABUS

Course Title: _____ Institution: _____

Unit Title: _____ Dates: _____

Date or Session	Instructional Activities	Assignment (Next Session)

APPENDIX II

Basic Workshop in Educational Method

Goals of the workshop

Mastery description

Workshop syllabus

Workshop session plans

Basic Workshop in Educational Methods

Goals of the Workshop

This is a basic workshop for new members of the teaching staff at the Ben Gurion University of the Negev Medical School. Its goals are to acquaint participants with the background of the Medical School and to provide them with basic skills in course design.

By the end of the workshop participants should:

1. be aware of:
   1 the rationale underlying the creation of a Health Science Center in the Negev.
   2 the goals of the medical school as originally formulated.
   3 the implications of institutional goals for the process and content of the educational program.
   4 the six year curriculum design, its implementation in the first two stages and current plans for stage three.
   5 the process of curriculum development, implementation and evaluation at the medical school.
2. be able to:
   1 derive instructional objectives for specific subject areas.
   2 develop test instruments for different aspects of evaluation.
   3 select teaching methods which are appropriate to the instructional objectives.
   4 prepare units of instruction using the Beersheva format.

These goals are derived from the set of responsibilities which members of the teaching staff will be expected to assume. These are described on pages 33 to 37, and should be read by each participant at both the beginning and end of the workshop. Evaluation of the workshop will be based on the goals which have been set and the degree to which participants emerge better qualified to fulfill their responsibilities as members of the teaching staff.

Outline of Teaching Responsibilities
at the Ben Gurion University of the Negev Medical School

The role of a teacher at the Ben Gurion University of the Negev may involve the following responsibilities:

1. To participate in the formulation of educational policy and development of the overall curriculum.

2. To design specific courses in collaboration with subject area committees.

3. To take an active part in implementing the educational program.

4. To participate in activities related to curriculum evaluation.

5. To communicate to others the goals and methods of the Medical School.

These responsibilities may be described in further detail as follows:

1. To participate in the formulation of education policy and development of overall curriculum.

   1.1 To participate in the activities of Coordinating Committees for several phases of the curriculum.

Such Activities include:

   a. Reviewing curricular content by subject area for each phase of the curriculum.

   b. Assigning priorities to the various subject area through allotment of instructional hours.

   c. Developing appropriate horizontal and vertical coordinating and integration.

   d. Overseeing implementation of the curriculum including identifying and solving problems encountered in carrying out the teaching program.

   e. Monitoring the process and outcome of curriculum evaluation including the development of integrative examinations for prupoess of certification.

   f. Developing proposals for curriculum revision on the basis of ongoing experience.

   g. Formulating recommendations for consideration by the Faculty Council.

2. To design specific courses in collaboration with subject area committees.

The teacher, in association with other members of a subject area committee, may be called upon to design a course or components of a course according to the following steps:

2.1 Formulate course objectives which;

a. Reflect the educational philosophy of the medical school.

b. Are competency-based and expressed in terms of student learning.

c. Reflect the educational philosophy of the Medical School.

d. Relate, when appropriate, to the mastery description of the primary care physician.

2.2 Select teaching methods according to criteria which include:

a. Relevance to the instructional objectives.

b. Appropriateness to the educational function desired.

c. Awareness of the range of options of teaching methods.

d. Facilitate learning at the problem-solving level.

e. Provide an optimal level of simulation.

f. Incorporate active student response.

2.3 To develop a plan for evaluation and design, valid and reliable test instruments appropriate to the different stages of the evaluation process.

These include:

a. Pre-requisite testing to assess entry level competencies.

b. Pre-testing to determine need for the proposed instruction.

c. Intermediate testing to provide student feedback and determine outcome of instruction for purposes of student feedback or certification.

2.4 To prepare units of instruction according to the Beersheva format. This includes specification of:

a. Theme of the unit

b. Topics covered (for cognitive components)

c. Key words.

d. Set of questions at the recall, application and problem solving, levels; each question is keyed to the respective topic.

e. Behavioral objectives (for skill components).

f. Instructional activities indicating how the unit is to be taught.

g. Methods of evaluation for the unit.

h. Pre-requisites.

i. Elements to be coordinated or integrated with other subject areas.

j. Test items related to the unit for inclusion in integrative examinations (optional).

2.5 To plan optional learning opportunities in the Learning Resource Center.

3. To take an active part in the teaching of courses.-

This involves implementing the course design utilizing the specified teaching methods. These may include:

a. Preparation of self-instructional materials.

b. Delivery of lectures and programed lectures.

c. Preparing audio-visual materials.

d. Leading small group seminars.

e. Conducting laboratory exercises.

f. Conducting activities in the Learning Resources Center ("magic room").

g. Supervising clinical experiences.

h. Assessing the outcome of evaluation procedures

i. Participating in the "debriefing" sessions.

j. Implementing loops for remedial instruction.

k. Selecting and orienting visiting teachers.

l. Mobilizing instructional resources and arranging the logistics associated with teaching the courses.

m. Improving solutions to unanticipated instructional problems.

n. "Injection teaching" in courses other than those for which the teacher has primary responsibility.

o. Reporting to the appropriate subject area and co-ordinating committees on the progress and outcome of the course.

4. To participate in activities related to curriculum evaluation.

The teacher may contribute to the process of curriculum evaluation by:

a. Assuming responsibility for evaluating, specific courses in subject areas for which he is responsible.

b. Contributing to the evaluation of certain phases of the curriculum (e.g. in the design and implementation of integrative examinations).

c. Participating in evaluating the cummulative impact of the curriculum over successive phases.

5. To communicate to others the goals and methods of the Medical School.

Situations in which teachers may be called upon to explain the goals and methods of the medical school include:

a. Explaining the educational program to students.

b. Working on the developement of instruction with new members of the teaching staff who have not as yet participated in the basic teacher training workshop.

c. Recruiting and orienting visiting teachers from other faculties and other institutions. Effective participation on the part of visiting teachers is contingent on their understanding the goals and educational approach of the Medical School.

Workshop Syllabus

Part I: Rationale and Goals

Session I	Health needs of the Negev
Session II	Problems of health care delivery
Session III	The Health Sciences Center
Session IV	Goals of the Medical School

Part II: Progress and Prospects

Session I	Basic principles
Session II	Overview of the six year curriculum
Session III	Fist Year Curriculum - Design and Implementation
Session IV	Second Year Curriculum - Design and Implementation
Session V	Third Year Curriculum - Progress in Planning

Part III: The Design of Instruction

Session I	Formulating instructional objectives
Session II	Planning of instructional activities
Session III	Evaluation of instruction
Session IV	Preparing units of instruction

Part IV: Evaluation of the Workshop

Workshop Session Plans

Part I: Rationale and Goals

Session I Health needs of the Negev

Session II Problems of health care delivery

Session III The Health Sciences Center

Session IV Goals of the Medical School

Session I: Health needs of the Negev

Guidance Questions

1. What are some of the ways in which the health needs of the Negev can be determined?
2. How might priorities in the health field as defined by health professionals differ from those perceived by the population?
3. How do the ethnic and socio-economic characteristics of the population in the Negev affect the health needs of the region?
4. In what ways might health needs in the Negev differ from those in other parts of the country?

Program

1. Assigned pre-session readings:
   a. Description of morbidity and mortality in the Negev.
   b. Demographic characteristics of the Negev population.
2. Introduction to the workshop - Dan Benor
   - goals of the workshop and criteria by which it will be evaluated
   - overview of the program of the workshop
   - responsibilities of participants during the workshop
   - introduction to the program of the first session
3. Introductory Presentation: Factors effecting health needs in the Negev - Dr. I. Torok
   - major sources of morbidity and mortality

- ethnic composition of the population
- socio-economic characteristics of the region
- geographic distribution of the population
- occupational structure

4. Small Group Discussions.

   These are based on the guidance questions. A rapporteur in each group records a summary of the main points raised.

5. Presentation and discussion of group summaries.

   The rapporteur for each group presents the summary in plenary session for discussion. A panel reacts to the points raised.

   For this session the panel consists of:

   Dr. I. Torek
   Dr. L. Haagan
   Dr. A. Antonovsky

6. Closure of the session - Dan Benor.

Session II: Problems of Health Care Delivery

Guidance Questions

1. What are the major problems inherent in the current patterns of health care delivery in the Negev?

2. How might changes in the delivery of health services better meet the health needs of the region?

3. What are the major problems encountered by the various categories of health manpower (e.g., physicians, nurses, technicians)?

4. How might changes in the structure of the health care system achieve more effective utilization of the various categories of health manpower?

5. What could be the role of physicians in bringing about these changes?

Program

1. Assigned pre-session readings:

   a. Use excerpts from report by Shmuel Raz.

   b. report prepared on health manpower in the Negev--prepared by Amichai.

   c. a critique of the medical care system in Israel.

2. Introductory Presentation.

   Patterns and problems of health care in the Negev--perspectives of a clinician. Shimon Glick.

3. Small Group Discussions.

   These are based on the guidance questions. A rapporteur in each group records a summary of the main points raised.

4. Presentation and discussion of group summaries.

   The rapporteur for each group presents the summary in plenary session for discussion. A panel reacts to the points raised.

   For this session the panel consists of:

   Dr. U. Spearman
   Dr. S. Moses

5. Closure of the session - Dan Benor.

Session III: The Health Sciences Center

Guidance Questions

1. To what extent do you think that the rationale underlying the establishment of the Center was justified?

2. How are the anticipated functions of the Center in the delivery of health care and in the training of health manpower related?

3. What major difficulties can be anticipated in translating the concept of a Center into actual practice?

4. What are the advantages and disadvantages of having established a medical school as the first school within the Faculty of Health Sciences?

Program

1. Assigned pre-session readings.

   a. booklet by M. Prywess on the idea of a Center.

   b. extracts from early government deliberations concerning the Center.

   c. extracts from the preamble of the contract between the University and Kupat Cholim.

   d. possibly extracts from articles which have appeared in the press.

2. Introductory Presentation.

   Moshe Prywess

   - tatorical background of the Center
   - rational for the existence of the Center
   - constituents within the Center and relationships between them
   - progress to date in making the Center operational

3. Small Group Discussions.

4. Presentation and discussion of group summaries.

   For this session the panel consists of:

   Dr. M. Fryxell
   Dr. U. Spearman
   Dr. I. Torek

5. Closure of the session - Dan Benor.

Session IV: Goals of the Medical School

Guidance Questions

1. Why might the goals of the Medical School in Beersheva be expected to differ from those of the other three medical schools in Israel?

2. Looking at the list of goals formulated at the time the Medical School was founded, what differences do you detect?

3. In the light of the considerations discussed in the three preceeding sessions, would you recommend that the goals of the medical school be changed in any way?

4. What are the implications of the Medical School goals in terms of the process and content of the educational program?

5. How feasible is such an educational program in the light of the constraints of the Beersheva situation?

Program

1. Assigned pre-session readings:

   a. list of goals of the Medical School (this list was used in previous workshops).

   b. excerpts from Progress Reports No. 1 and 2 describing the philosophy of the medical school in general terms.

   c. excerpts from the documentation sent to applicants for admission to the Medical School which describes the goals of the Medical School.

2. Small Group Discussions.

3. Presentation and discussion of summaries of small group discussions.

   The discussion panel for this session consists of:

   Dr. D. Benor
   Dr. S. Glick
   Dr. A. Horowitz

4. Closure of the session - Dan Benor.

Part II Progress and Prospects

Session I	Basic principles
Session II	Overview of the six year curriculum
Session III	First Year Curriculum - Design and Implementation
Session IV	Second Year Curriculum - Design and Implementation
Session V	Third Year Curriculum - Progress in Planning

Session I: Basic Principles

Topics

1. The spiral approach to curriculum planning
2. Horizontal and vertical integration
3. Concept of a "core" curriculum
4. Commitment to systematic course planning
5. Emphasis on individualized learning
6. Teaching at high levels of simulation
7. Emphasis on community dimensions of medical care.

Guidance Questions

1.1 What are some of the advantages and disadvantages of the spiral approach to curriculum planning as compared with the layer approach?

1.2 What justification is there for beginning instruction in clinical and community medicine in the first year of studies?

2.1 What is the significance of horizontal and vertical integration within the context of a spiral approach to curriculum development?

3.1 How does a "core" curriculum differ from the traditional curriculum? What are the consequences of adopting a "core" curriculum approach?

4.1 How might the application of a systematic approach to course planning affect the content and process of the educational program?

5.1 In what ways does an emphasis on individualized learning affect the design of instruction?

6.1 What factors limit the level of simulation at which any given course can be taught?

7.1 What implications does an emphasis on the community dimensions of medical care have in terms of teaching the basic sciences?

Program

1. Presentation: Basic Principles
   Dan Benor

   This presentation will cover the topics listed above and will serve as the main source of information on which to base the small group discussion. This presentation should probably take from 30-45 minutes.

2. Small group discussions.

3. Presentation and discussion of small group summaries.

   The discussion pannel for this session consists of:

   Dr. Carmi Margolis
   Mrs. M. Mottner

4. Closure of session -- Dan Benor

Session II: Overview of the Six Year Curriculum

Guidance Questions

1. To what extent does the 6 year curriculum projection reflect the educational goals and basic principles of the Medical School? Discuss any inconsistencies you identify.

2. In what ways might graduates of the Beersheva curriculum differ from the graduate of Jerusalem or Tel Aviv?

3. How does the proposed curriculum for Beersheva differ from that of the medical school in which you studied? (question to be answered by physicians)

4. What are some of the difficulties to be anticipated in implementing the Beersheva type of curriculum?

Program

1. Assigned pre-session readings:

   a. Diagram of the initial 6 year curriculum projection.

   b. Discussion of the six year curriculum from the Lockett report (copy enclosed).

   c. Examples of curriculum from U.S. medical schools from AAMC book.

2. Presentation:

   Explanation of the initial 6 year curriculum projection.

   Dan Benor

   Questions for information or clarification only in plenary session.

3. Small Group Discussions

   Based on Guidance Questions

4. Presentation and discussion of small group summaries
   (No discussion panel for this session)

5. Closure of the session -- Dan Benor

Session III: First Year Curriculum - Design and Implementation

Session III, IV and V are designed primarily to transmit information rather than stimulate creative discussion. The sessions, therefore, consist of various presentations of the curricular components. There are no guidance questions.

Program

1. Assigned pre-session readings:

   a. Excerpts from Progress Reports 1 and 2

   b. Copy of the schedule for the first year of studies

   c. Discussion of first year program in Lockett report

2. Introductory Presentation

   First Year Curriculum: An Overview (including problems and lessons learned in the 74-75 academic year)

   Oded Sussking

3. Presentation of curricular components

Basic Sciences	Nomi Meyerstein/R. Yagil
Community Medicine	R. Israeli
Behavioral Sciences	H. Antonovsky
Clinical	D. Benor

4. Reaction of student panel

   There should be a panel of 3-4 students (perhaps 2 from the first year and 2 from the second year) to react to the presentation of each component of the curriculum.

5. Questions, clarifications and discussion in plenary session.

Session IV: Second Year Curriculum - Design and Implementation

Program

1. Assigned pre-session reading

   a. Outline of second year curriculum (to be prepared by Dr. Benor and Mr. Suskind).

2. Introductory Presentation

   Second Year Curriculum: An Overview

   Dan Benor

3. Presentation of curricular components

Cell Biology	I. Rabinowitz/C. Perach
Basic Medical Sciences (Anatomy, Pathology, Physiology, Pharmacology)	D. Benor
Clinical	C. Margolis
Behavioral Sciences	A. Antonovsky
Community Medicine	D. Cohen

4. Reaction of student panel

   There should be a panel of 2-3 second year students to react to the presentation of each component of the curriculum.

   Questions, clarifications and discussion in plenary session.

Session IV: Third Year Curriculum - Planning

Program

Dr. Benor will discuss the ideas currently guiding the planning of the 3rd year (e.g. integrated organ system approach, focal problem approach) and the logistics of the planning process.

Drs. Epstein, Currie, and Bloomfield will contribute by describing the approach used at their schools.

Part III: The Design of Instruction

Session I: Formulating instructional objectives

Session II: Planning of instructional activities

Session III: Evaluation of instruction

Session IV: Preparing units of instruction

Session I: Formulating instructional objectives

Objective: At the end of this session the participant should be able to formulate cognitive and skill objectives.

Guidance Questions

1. What is the utility and what are the limitations for formulating instructional objectives?

2. In the cognitive domain, what is the advantage of specifying a topic and formulating related questions rather than using the standard behavioral format for expressing an instructional objective?

3. Are objectives (questions) at the recall level useful at all? If so, in what types of situations?

4. In the domain of psychomotor or interpersonal skills, why is it useful to adhere to the classical behavioral objective format?

5. What should be the basis for deriving objectives? What criteria should be used to determine whether to include a given objective in designing a course?

Program

1. Assigned pre-session readings.

   a. "Recognizing Instructional Objectives" (from an older version of the "Handbook.")

   b. Mager's book on instructional objectives.

c. A set of examples of:

1. Cognitive objectives

a) expressed in behavioral terms (can be taken from biology syllabus--1974-1975 academic year).

b) expressed in topic and question form--for comparison. (Can be taken from same biology syllabus--e.g., "blood" for the 1975-1976 academic year.)

2. Skill objectives--in behavioral terms taken from:

a) laboratory skills (biology)

b) clinical skills (clinical program)

2. Introductory Presentations.

a. Cognitive objectives - D. Benor

b. Levels of cognitive objectives - H. Notzer/Mrs. Maeler

c. Skill objectives - O. Ziskind

d. Attitudinal objectives - C. Margolis

3. Small group sessions.

a. discussion of guidance questions

b. critical examination of examples of objectives included in the assigned pre-session readings

4. Presentation of small group summaries.

Panel of discussants:

H. Notzer
Ms. Maeler
O. Ziskind
C. Margolis

5. Practice in formulating objectives.

Each student is to select from his own discipline:

a. one cognitive objective; this is equivalent to one topic. The task is to develop questions related to the topic selected, at the recall, application and problem solving levels.

b. One skill objective: The task is to develop a behavioral objective related to a specified skill.

Note: Participants should be encouraged to gain as much practice as possible in formulating objectives. Perhaps more than a single example from the cognitive and skill domains should be included.

When a participant has completed writing the objectives, he should submit them to another member of his small group for critical evaluation. Any problems should be brought to the attention of one of the instructors.

6. Closure of the session - Dan Benor.

Session II: Planning of Instructional Activities

Objective: At the end of this session the participant should be aware of the advantages and limitations of selected teaching methods and be able to select among them by applying criteria related to the instructional function desired.

This session should be based on assigned readings and in-class demonstrations. It is entirely a plenary session. No guidance questions are provided.

Program

1. Discussion of the instructional functions chart - Dan Benor.

   This discussion should indicate how to use the chart in selecting instructional activities.

   Questions, comments, clarifications in plenary session.

2. Demonstrations and discussion of teaching methods.

   a. the self-instructional approach

Examples

1. Self-instructional materials - Organic chemistry - Malca Corodetsky
   - Malca explains technique and demonstrates materials used.
   - Second year students describe their reactions to the approach.

2. Programmed instruction - Statistics in small doses - Lippy Friedman
   - Lippy demonstrates the book and describes how it is being used.
   - First year students describe their reactions to the book.

3. Self-instructional approach - Biochemistry - A. Livneh
   - Avinoam describes the method he is using and demonstrates the units of instruction.
   - Two second year students describe their reactions.

b. Small Group Teaching

1. Communication - 1st year - Beatrice Priel

• B. Priel describes the small group sessions in communication.

• Two first year students give their reactions.

2. Biochemistry - A. Livnah

• The effects of small group discussions in biochemistry.

c. Use of audio visuals

1. Use of videotapes:

Communication - B. Priel (will also include description of microteaching by Jeri Cohen).

Technical aspects will be demonstrated.

Physiology - Mike Gutnick demonstrates a methodological tape.

2. Use of slides:

Histology - G. Perach (also will discuss technical aspects).

3. Overhead projectuals:

Michael Adam will demonstrate different projectuals.

Oded Susskind will demonstrate the Gestetner machine.

4. 16 mm. films:

O. Susskind will describe use of films in the "magic room."

d. Teaching through laboratory experiences

1. Biology:

Reuben Yagi - will describe his approach and demonstrate syllabus.

Reaction of 1-2 students.

2. Cell Biology:

Zelig describes labs.

Reaction of 1-2 students.

3. In or out of class assignment.

   Participants take the objectives developed in Part III - Session I and describes how they would teach to meet these objectives.

4. Closure of the session - Jan Bener

Session III: Evaluation

Objective: At the end of this session the participant should be able to develop test items for pre-requisite, pre-progress and post tests.

Topics

1. Purposes of evaluation
2. Evaluation at different points in time in a course
3. Norm and criterion referenced tests
4. Validity and reliability in testing

Guidance Questions

1.1 What are the main purposes of evaluation in relationship to a) the student b) the teacher c) the instructional system.

2.1 How could the results of a pre-test (with a pre-requisite component) be used a) to guide students and b) as a basis for altering the proposed instruction?

2.2 "The pre-requisites for a second level course (e.g. biochemistry) should serve as the basis for deriving objectives of the antecedent first level course (e.g. organic chemistry)." Discuss the implications of this statement.

2.3 What are the advantages and disadvantages of self-tests for progress evaluation?

2.4 How can the results of feedback from student progress be used to develop loops for remedial intervention?

3.1 How does the use of criterion-referenced tests affect the design of instruction?

3.2 To what extent do you feel that the teacher is accountable for student performance on tests?

4.1 Discuss the following types of examinations in terms of relative validity and reliability:

a. Oral examination

b. Multiple choice examinations

c. Essay examinations

Program

1. Assigned pre-session readings

   a. Enclosed materials from Systematic Course Design for the Health Fields

   b. Examples of pretests and post tests from first year of studies

   c. Excerpts from the integrative examination

2. Introductory Presentation:

   a. Purposes of evaluation: Dan Benor

   b. Norm/criterion-referenced tests: N. Notzer

   c. Validity and reliability: N. Notzer

3. Small Group Discussions

   a. Based on guidance questions

   b. Critical review of the examples of pre and post-tests and the integrative examination included in the assigned pre-session readings.

4. Presentation and discussion of group summaries

   Panel of Discussants:

   D. Benor
   N. Notzer
   C. Margolis
   O. Suskind
   Ms. Maeler

5. In or out of class assignments.

   Participants prepare test items (prerequisite, pre, progress, post) for the objectives which they formulated in Part III: Session I)

6. Closure of the session: Dan Benor

Session V: Preparing Units of Instruction

Objectives: By the end of this session students will be capable of producing a complete instructional unit in their areas of interest.

Topic

The unit of instruction

Guidance Questions

1. What are the basic elements of a unit of instruction?
2. What are the steps in preparing a unit of instruction?
3. What is the purpose of distributing the units of instruction to students prior to the course?
4. How can units of instruction be used for purposes of evaluation?
5. How can units of instruction be adapted to permit a greater degree of self-learning?

Program

1. Assigned pre-session reading:
   a. Format of a unit of instruction
   b. Examples of well prepared units of instruction (biology, genetics)
2. Assigned pre-session task.

   Each participant prepares a complete unit of instruction which is brought to the session.

Part VI: Evaluation of the Workshop

This will be based on the goals of the workshop and the description of teaching responsibilities at the Medical School.

APPENDIX III

Two Examples of Units of Instruction

developed at the

Faculty of Health Sciences

Ben Gurion University of the Negev

Biology Systems - Blood

Society, Culture and Health - Sociocultural Change

Unit of Instruction

BIOLOGY SYSTEMS

BLOOD

Unit No. 9

SUBJECT: Blood Groups

A. Topics

1. Main blood groups of the erythrocytes ABO RH

   Subgroups

2. Inheritance of blood groups

3. Antigens of blood groups in secretions

4. Antigens of leucocytes

5. Selection of blood for transfusion - blood groups

6. The role of blood groups in family medicine

B. Key Words

Antigen; antibody; RH; ABO; genetic marker; Mendelian coduminance; secretors; HLA antigens

C. Questions

C.1 Information questions

1.1 Define the main blood-groups (of erythrocytes).

1.2 Define genetic marker.

1.3 Define secretors.

1.3.1 What is the frequency of secretors and non-secretors in a population?

1.4 Define HLA antigens.

1.5 Present in table-form the necessary matching of blood groups for donor-receiver.

1.6 Present in table-form the possible blood groups for children of parents having blood groups A and B.

C.2 Applied questions

2.1 What is the best type of blood to use as an infusion in the battle field when there is no time to examine blood groups?

2.2 The blood groups of a pregnant woman is O,Rh-. Her husband is O,Rh+. What is the possibility of the baby having Rh+?

2.3 How is it possible to determine if a person belongs to the population of secretors?

2.4 Give cases where the antigenic make-up of the leucocytes and thrombocytes can be of the utmost importance.

2.5 Given are two types of animals: The one (hamster) blood can be transfused from one animal to the next without problems. However, the second type (man) blood infusions can't be done haphazardly. What is the reason for these facts and how can you recognize them?

C.3 Problem solving

3.1 A pregnant woman is brought to the "mother and child" clinic. She has blood group O,Rh-. It appears that she had children with blood group Rh+. How would you follow the pregnancy and what would you do at birth and after it?

3.2 How would blood typing aid in genetic determination of ethnic origin?

3.3 Describe how you would change the blood group of an individual.

3.4 Describe an experiment to demonstrate whether erythrocytes with group O lack antigens or whether there are antigens.

3.5 How can you explain the genetic overlapping between certain thrombocytes and leucocytes?

3.6 A man and a woman are suffering from shock due to massive bleeding. They have A,Rh- blood groups. The only available blood is of A,Rh+. Would you infuse this blood? How would you treat each patient?

D. Skills

1. The student will be able to determine blood groups A, B, O and Rh without mistakes.

2. The student will be able to examine which blood can be used for infusion in a certain individual and to decide whether to infuse a certain blood.

E. Attitudes

1. Encouraging blood donations

2. Problem of payment of blood donors

3. Encouraging blood donors in development towns

4. Determining origins of population

F. Prerequisites

1. Basic genetics: Mendelian inheritance
   Population genetics

2. Basic embryology

3. Basic biochemistry

G. Integration with other courses

Embryology; Clinical day (mother and child); Pediatrics; Immunology; Genetics; Biochemistry.

H. Class activity

1. Discussion on reading assignment

2. Exercise, e.g., 1.5 or 1.6

3. Laboratory: determination of blood groups

4. Magic room: determination of blood groups. Statistics. Infusion from animal to animal. Coombs. Geographical distribution of blood groups.

I. Question for deliberation

Describe a method to change the blood group of an organism.

J. Evaluation

Knowledge: Post test; discussion in laboratory

Skills: Laboratory

K. Reading

1. Best and Taylor. Chapter 4, pp. 48-51.

2. Beck

3. Weiner, 1954.

Unit Six

Subject: Sociocultural Change

A. Topics

1. Levels of change

   a. societal
   b. institutional
   c. social network
   d. normative

2. Change in the individual

3. Sources of change

4. Induced change and the health worker

B. Key Concepts

Cultural "lag"; diffusion; selective adaptation; perceived need; power; authority; imposed change; induced change; vested interests.

Outline of the levels and types of change

Societal:
Power relations; resources; technology; values shaping; resources allocation.

Institutional:
Relative importance of; institutions; functions; social network composition.

Social network:
Values; resources; social category composition; internal and inter-network; structure; roles.

Normative:
Norm content; relative importance of norms.

Change in the Individual:

role occupancy; the problem-behavior complex; rebources at one's disposal.

C.1 Content Questions

1.1 Analyze the statement: "A woman who had a breast removed surgically is no longer the same person she was before the operation."

1.2 What priorities are assigned, in your society, to the functions of the health institution in comparison to the functions of two other social institutions? Provide some evidence for your reply.

1.3 Consider a specific hospital with which you have some familiarity. Give one example of each of the five types of social network change which has taken place in the last decade.

C.2 Application Questions

2.1 Specify three significant characteristics of the medical student role which are not appropriate to the professional role of the physician, and indicate how they are modified over time.

2.2 Indicate five different ways in which health workers can change the resources available to people.

2.3 Discuss the significance and implications of the physician-patient relationship being based on power as against authority.

2.4 How would you go about seeing to it that a woman visits a breast cancer detection clinic annually? How would you persuade a driver to use a safety belt? Discuss these questions in terms of the theoretical principles involved.

C.3 Problem-Solving Questions

3.1 Discuss the possible expansion of the functions of the family in meeting health needs, as suggested in the footnote on p.4.

3.2 Analyze the extent to which you were prepared to adapt to the changes in your role set involved in your entry into professional school.

3.3 Discuss the perception of the unmet needs which might well bring a medical student to demand curriculum changes.

C. Reading Assignment

1. Chapter Six in the text.

2. John Cassel, "A Comprehensive Health Program among South African Zulus," in B.D.Paul, ed., Health, Culture and Community. New York: Russel Sage Foundation, 1955, 13-41.

APPENDIX IV

Examples of Evaluation Instruments

Faculty of Health Sciences

Ben Gurion University of the Negev

Pre-test

Post-test

Portion of Final Integrative Examination - 1st year

CIRCULATION

Pre - Test

1. It has been stated that "the onthogenesis is a shortened repetition of the phylogenesis." Can you prove this statement on the basis of the gill's development?

2. Many mammals are both marine and terrestrial. Suggest a central system for preservation of both high and constant body temperature in those animals.

3. A healthy man got by mistake an excessive intravenous infusion. The pressure in his pulmonary artery would be:

   a. lower than the normal in this vessel
   b. higher than the normal and approximately the same as in the left ventricle
   c. higher than the normal, but not as high as in the left ventricle.

4. A pressure suit is pressing on the lower half of the body of a man, standing still. What will be its effect on cardiac output?

   a. will not be changed
   b. will be lower than before
   c. will be higher than before

5. The inner diameter of the aorta of a dog has been narrowed experimentally from 5 to 3 millimeters. As a result:

   a. the heart would not be able to pump blood, and the animal will die
   b. the cardiac output will return to its normal after a few heart beats
   c. the cardiac output will remain low, and the dog will survive only by reducing its activity

6. Newtonian fluid is pumped through a pipe of 1 cm. radius at the rate of 1 liter/min. What will be its flow rate after increasing the radius to 2 cm, assuming that the pressure, the viscosity of the fluid and the length of the pipe have not been changed:

   a. 32 liters/min
   b. 64 liters/min
   c. 6 liters/min
   d. 8 liters/min
   e. 4 liters/min

7. Constant dropping of acetyl-choline on the anterior surface of the right ventricle in a mammalian will cause:

   a. increase of the rate of all the heart chambers
   b. decrease of the rate of all the heart chambers
   c. no change in heart rate
   d. absolute paralysis of the heart in contraction (systole)
   e. contraction of the right ventricle only

8. Given 3 schematic drawings of action potential:

   Identify which of them describes the action potential of the Sino-atrial node; of the atrial muscle; of the ventricular muscle.

9. The renal blood flow is constant in a resting organism (about 20% of cardiac output, or about 1 liter/min). During maximal effort, as running, the cardiac output may be increased 5 fold. What will be the renal blood flow?

   a. 5 times the resting value
   b. as at rest
   c. lower than at rest

10. The oxygen consumption (V_{O_2}) of a subject was 0.25 liters/min; and the oxygen content was 15 vol% venous (CV_{O_2}) and 20 vol% arterial (Ca_{O_2}).

    What is the cardiac output (Q) of this subject?
    Explain your calculations.

CIRCULATION

Post - Test

1. Explain in a few sentences why the same amount of blood is flowing from the right ventricle to the lungs, as from the left ventricle to the aorta.

2. Immediately after the second heart sound, the volume of the left ventricle will be:

   a. larger
   b. smaller
   c. same

3. The depolarization phase of a heart muscle cell (phase 0), is caused by:

   a. entrance of sodium ions into the cell
   b. exit of sodium ions from the cell
   c. exit of chlorine ions from the cell
   d. entrance of calcium ions into the cell

4. Given an ECG tracing (L_2), measure and list:

   a. the ventricular rate
   b. the artrial rate

   Is it a tracing of a healthy person? Explain

5. Fear increases the epinephrin secretion. In such a case, what will be the blood pressure?

   a. increased
   b. decreased
   c. unaffected

6. The arterial peripheral resistance is:

   a. larger in the lungs than in the kidneys
   b. smaller in the lungs than in the kidneys
   c. equal in the lungs and in the kidneys

7. The opening of the aortic valve:

   a. is earlier than the opening of the mitrol valve
   b. at the same time as the mitrol valve
   c. later than the mitral valve

8. The renal blood flow is constant in a resting organism (about 20% of cardiac output, or about 1 liter/min.) During maximal effort, as running, the cardiac output may be increased 5 fold. What will be the renal blood flow?

   a. 5 times the resting value
   b. as at rest
   c. lower than at rest

9. a. Draw the relationship between cardiac output (Q) and the pressure in the right atrium (P_{RA}), when:

   Q = 5 liter/min
   P_{RA} = 1 mm Hg
   $P_{\bar{v}}$ = 7 mm Hg

   b. After epinephrin injection Q increased to 10 liters/min, and P_{RA} decreased to 0. What will be $P_{\bar{v}}$?

   c. Demonstrate the change in the relationships, considering the negative pressure in the chest cavity of -3mm Hg. (Q and P_{RA} as in a.)

   d. Show the effect of Val-Salva maneuver on the relationships. (Use the same scheme as c.)

   Why is the heart rate increasing?

Examinee No. _____

Final Examination - First Year

Written Examination:
CHAPTER C,
BOOKLET A

Instruction Sheet

Read the following instructions carefully and act in accordance with them.

1. In Booklet A you will find a short narrative and a data sheet (colored). Read them through before beginning to answer the questions.

2. After reading Booklet A you will find questions relating to the respective sections of the narrative in Booklet B. Reread the corresponding section in the narrative and on the data sheet.

3. Answer the questions in Booklet B.
   Write your answers on the examination sheet in accordance with the instructions for each question.
   If necessary you may use the left side as scrap paper.

4. Answer briefly. Answer as requested in each question and do not add uncalled for explanations. Use letters and arrows if they save words and time. Under no circumstances are you to answer beyond the allotted answer space. Anything written outside the allotted space will not be checked.

5. The recommended time to answer each question is written before the question. Use this recommendation as a guide to efficient division of the test period. It is not compulsory.

GOOD LUCK !!

NARRATIVE

(1) As usual, Mr. Davshuni, who lived alone on the third floor of Block 5, went down to the grocery store. He accidently walked into a fight between the neighbor's son, with whom he had strong emotional ties, and a bigger boy, unknown to him. Mr. Davshuni forgot his poor health and advanced age and tried to separate the two. Unintentionally one of the boys punched him in the chest. The pain and the insult mixed together. He felt strong chest pains, became pale and was about to fall. Passersby rushed to him, but he calmed them. Despite Mr. Davshuni's objections, the grocery store owner, who knew him, preferred to take him to the Emergency Ward at the Hospital.

(2) Mr. Davshuni reached the Emergency Ward. He told the doctor on duty that he was diabetic, about the blow received, and described the pains which he suffered in his chest. The ECG taken showed no changes characteristic of coronary heart disease or myocardial infarcation, but the doctor knew that such changes develop over time and that their absence doesn't negate such a diagnosis. Thus the doctor applied a number of diagnostic tests in order to discover the reason for the chest pains.

(3) During treatment and examination Mr. Davshuni ceased to breathe and his pulse stopped. Immediate resuscitation therapy was necessary including external heart massage, respiration by machine and infusion of fluids. Developing acidosis was treated as required. In the wake of this treatment the ECG showed renewed heart activity and a definite diagnosis of a fresh myocardial infarcation.

(4) About an hour after arriving at the Emergency Ward, Mr. Davshuni was transferred to the Intensive Cardiac Care Unit (ICCU) for continued surveillance and treatment. At this time he was fully conscious and breathed spontaneously, but suffered pains. In the following days the pains diminished and his general feeling improved, but cardiac insufficiency accompanied by edema in the extremities appeared. The doctors now devoted themselves to balancing his diabetic condition through insulin treatment and careful checks of his blood and urine sugar levels.

(5) The course of Mr. Davshuni's illness showed regular improvement. Thanks to the treatment, his cardiac insufficiency decreased and sugar values remained at a normal level. Mr. Davshuni was allowed to get out of bed and slowly renew activity. At the time of his release a staff conference was held at which a rehabilitation program was presented. Mr. Davshuni was very grateful, aware of the gravity of his illness and promised to follow the strict regimen that was prescribed. Therefore he refused to drink a toast at the modest party held for him in his apartment by his neighbours upon his return home.

DATA SHEET

1. Mr. Nathan Davshuni, born 1899.

   Widow of many years, childless.

   Native of Romania. Immigrated to Israel in 1961. Since then resides in Beer Sheva.

   Profession: Accountant. Retired on pension for 8 years.

2. Results of initial Emergency Room checks:

   Looks his age. Does not appear to be seriously ill. Suffering from pains. Spontaneous breathing. BP-170/95. Pulse-88, regular. No findings over heart and lungs. No glands. No edema of extremities.

   ECG - slight left ventricular widening - normal for his age.

   Urine - Sugar 3+. Acetone - negative.

3. Mr. Davshuni's blood sugar values during hospitalization period: (highest value for each week).

	Blood glucose mg %	Insulin dosage
On arrival	240	20 A R
Week 1	220	28 A R
Week 2	140	24 A RZI
Week 3	110	20 A RZI
Week 4	115	20 A RZI

Examinee No. _____

Final Examination - First Year

Written Examination:
CHAPTER C,
BOOKLET B

Questions for Section 1 (Recommended time for entire section, 20 minutes.)

1. On the basis of his condition, Mr. Davshuni could be classified in a high risk group. List 4 primary reasons for this classification.

   A. _____

   B. _____

   C. _____

   D. _____

2. Mr. Davshuni spent a lot of time in the neighbourhood grocery, chatting and helping the grocer with simple chores. He also spent much of his time with the neighbour's son, a high school student, and tried to help him with his studies. Following are four explanations for Mr. Davshuni's behavior.

   Next to each, cite the behavioral principle which it demonstrates. (Use the professional concept - key words.)

   A. to have a conversation partner and a way to pass the day

   B. to feel younger

   C. to avoid thoughts about death

   D. to prove that he is still useful

3. When he received the blow, Mr. Davshuni went pale and felt faint. These phenomena can be caused by a number of circulatory mechanisms. Which among the listed possibilities is absolutely <u>not</u> possible? (Mark the <u>incorrect</u> possibility.)

   A. vasoconstriction accompanied by lowered cardiac output and lowered blood pressure

   B. vasoconstriction without change in cardiac output and with lowered blood pressure

   C. vasoconstriction with lowered cardiac output and without change in blood pressure

   D. vasoconstriction without change in cardiac output or blood pressure

4. Panic is a stress condition in which several systems are activated. Which of the following systems were liable to be activated when Mr. Davabuni panicked? Cite the systems by drawing a connecting line between the appropriate control organ, the appropriate secretory gland and the secreted substance (only systems activated during panic).

Hypothalamus	Pancreas	Corticosteroids
Motor Cortex	Testis	Catecholamines
Anterior Hypophysis	Adrenal Cortex	Androgens
Posterior Hypophysis	Adrenal Medulla	Insulin

Questions for Section 2 (Recommended time for entire section, 50 minutes.)

1. Mr. Davshuni told the Emergency Room doctor of his chest pain and described it. The doctor should have asked about which characteristics of pain? (List at least 6 characteristics.)

   A. _____

   B. _____

   C. _____

   D. _____

   E. _____

   F. _____

2. The doctor utilized the services of the Clinical Biochemistry laboratory in order to pinpoint the site of injury. A sample of the patient's blood was checked for LDH activity (lactic dehydrogenase) with the following reaction procedure:

   0.01 ml serum (diluted 1:1000)

   0.9 ml buffer pH 7.4

   0.05 ml pyruvate (10μ mole/ml).

   0.05 ml NADH (3μ mole/ml).

   The following results were recorded by spectrophotometry at wavelength 340:

Time of check	0	2	4	6	8
O.D	1.0	0.8	0.59	0.42	0.21

   Assume that 1 mM of NADH gives O.D of 6.2.

   (Recommended time for all parts of question 2 is 20 minutes.)

2.1 Calculate the LDH activity in Mr. Davshuni's serum.

2.2 The normal activity of LDH in serum is 90-200 μmole/ml/min. In view of this fact and in view of your calculations for question 2.1, mark the correct answer.

A. Mr. Davshuni suffers from an injury to the heart muscle.

B. Mr. Davshuni suffers from an injury to the chest muscles.

C. Mr. Davshuni suffers from an injury to both.

D. There is not enough information to determine the location of the injury.

2.3 If you answered A, B, or C - how did you reach your conclusion? If you answered D - which additional tests are required? (Answer briefly.)

3. Atrial fibrillation (irregularity of atrial contraction) was diagnosed from Mr. Davshuni's ECG.

The following are four ECG traces which demonstrate a normal pattern and three types of disturbances (with L_1 connection).

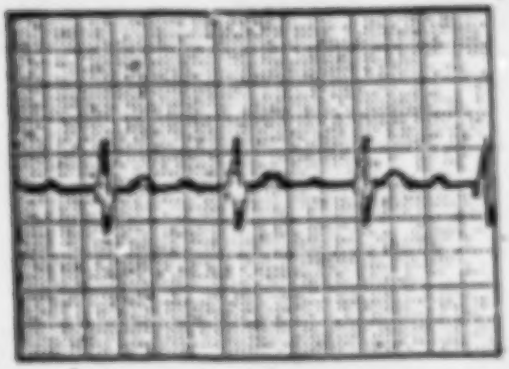
Next to each of the following descriptions, cite the number of the trace which most closely fits the description.

A. Normal trace _____

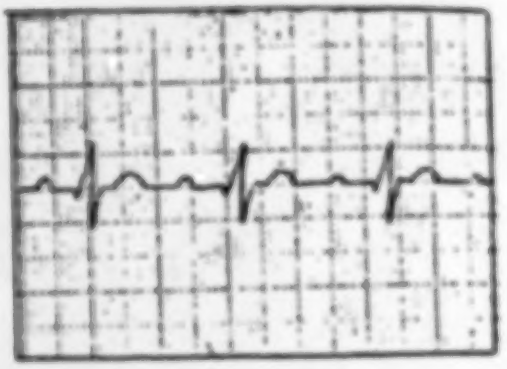
B. Irregularity of atrial contractions (atrial fibrillation) _____

C. Impeded impulse conduction (extended duration of transfer of impulse to ventricles) _____

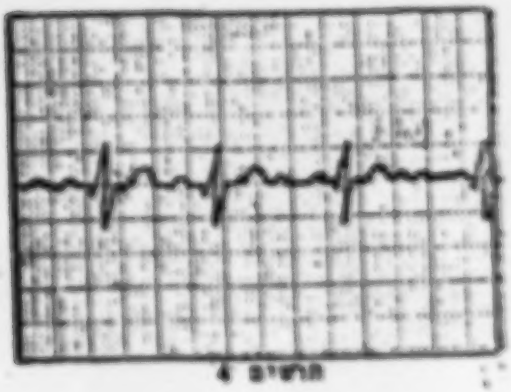
D. Impeded impulse conduction (extended conduction of impulse in ventricles) _____



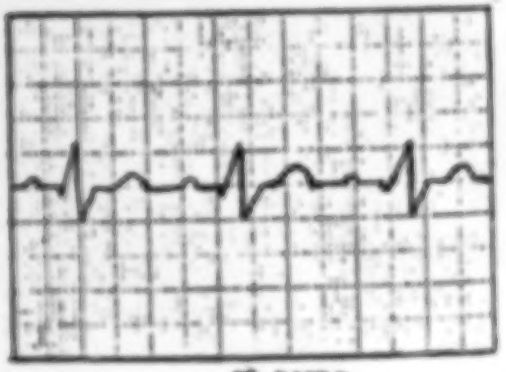
2 דגימה



1 דגימה



4 דגימה



3 דגימה

4. The principle behind the electrocardiograph can be explained simply with a physical model. You have a closed bladder enclosed by a membrane with a thickness of 7 nanometers. The membrane is charged negatively on the inside and the outside has equally dense positive charges.

4.1 Calculate:

A. the electric potential outside of the bladder _____

B. the electric potential inside the bladder _____

C. the electric field outside of the bladder _____

D. the electric field inside the bladder _____

E. the electric field outside of the bladder if a piece of it were torn apart. _____

4.2 Briefly describe the connection between the described model and the electrocardiogram.

_____

_____

_____

_____

5. Because of the pain, Mr. Davshuni's breathing was shallow and his lungs did not fill. What change will take place in the following lung volumes as a result of shallow breathing?

Mark: A: when the volume grows

B: when the volume becomes smaller

C: when the volume doesn't change

A. total lung capacity _____

B. vital capacity _____

C. inspiratory reserve vol. _____

D. expiratory reserve vol. _____

E. residual volume _____

F. tidal volume _____

G. functional residual capacity _____

Questions for Section 3 (Recommended time for entire section: 60 minutes.)

1. During treatment Mr. Davshuni began to breathe very shallowly, and after a few minutes ceased breathing entirely.

   Assume that when his breathing was very shallow his tidal volume was 150 ml. (There is no connection between this data and the previous question.) Would an increase in the respiratory rate compensate for the lowered volume and prevent death?

   Answer and explain briefly:

   _____

   _____

   _____

2. The respirator can be regulated. The doctors controlled the respiratory rate, the respiratory depth (volume breathed) and the percentage of oxygen in the respired air. The respirator was continuously adjusted in accordance with results of regular P_{O_2}, P_{CO_2} and pH checks of Mr. Davshuni's blood.

   The following is a table which summarizes the results of the patient's blood checks during the resuscitation stage (by sampling of arterial blood).

   2.1 In the designated place in the table cite the normal values of the three variables.

   2.2 Regulate the respirator during the various stages of resuscitation in accordance with the data. Determine the percentage of oxygen, respiratory volume and rate.

(table on next page)

Mark: A: the regulator must be increased compared with normal breathing

B: the regulator must be lowered compared with normal breathing

C: no change is needed compared with normal breathing.

(Recommended time is 15 minutes.)

Variable	Normal value (spont. breath)	1st stage resus.	2nd stage resus.	3rd stage resus.
P_{O_2} mm Hg.	------	88	42	68
P_{CO_2} mm Hg.	------	45	76	30
Plasma pH	------	7.18	7.2	7.45
% oxygen	20%	------	------	------
breathing depth (volume)	500 ml/min	------	------	------
respiratory rate	12-16/min	------	------	------

3. Upon death, the pH of plasma immediately drops to acidotic values. Maintenance of pH is one of the problems of resuscitation, and is accomplished by infusion of a buffer solution containing carbonate and bicarbonate.

3.1 What must the concentration ration between bicarbonate and carbonic acid be in order to get an alkaline solution of pH 7.5? Assume that the acid's pKa is 6.37.

Mark the correct answer, and show your method of calculation.

A. 17.5

B. 13.5

C. 9.5

D. 4.5

Method of Calculation:

3.2 What amount of sodium bicarbonate would you use in order to prepare the buffer solution?

Assume: 1. Mr. Davshuni received 1000 ml. of the infusion.

2. The acid concentration in the solution (carbonic acid) is 1.2×10^{-3} M.

Calculate the amount of sodium bicarbonate, and express it in terms of:

1. grams (gr)

2. moles (M).

Amount of bicarbonate: _____

_____

Method of calculation: _____

_____

_____

_____

4. How did Mr. Davshuni's acidosis effect glycolysis in his red blood cells?

A. Cite the stage at which acidosis had its effect.

B. Propose an experiment to prove your argument.

_____

_____

_____

_____

_____

_____

5. Resuscitation methods included external cardiac massage. Four descriptions follow, part of them correct, which explain the reason for cardiac massage.

Mark: A: the principal reason for external cardiac massage

B: the description of descriptions which are incorrect.

A. Mechanical activation of the heart muscle as a substitute for electric, physiological activation

B. Stimulation of the pacemaker in order to bring about renewed self-activation

C. Stretching of the heart muscle in order to increase the strength of contraction (according to Starling's Law)

D. Inducing flow of blood from reservoirs (veins, major arteries) and its return to circulation.

6. The alkaline solution for infusion can be prepared in various solvents, in accordance with the conditions in each case. Which of the following solvents would you use in order to prepare Mr. Davshuni's infusion? Mark the solvent that you choose.

A. Hartman (physiological solution) _____

B. glucose 5% _____

C. distilled water _____

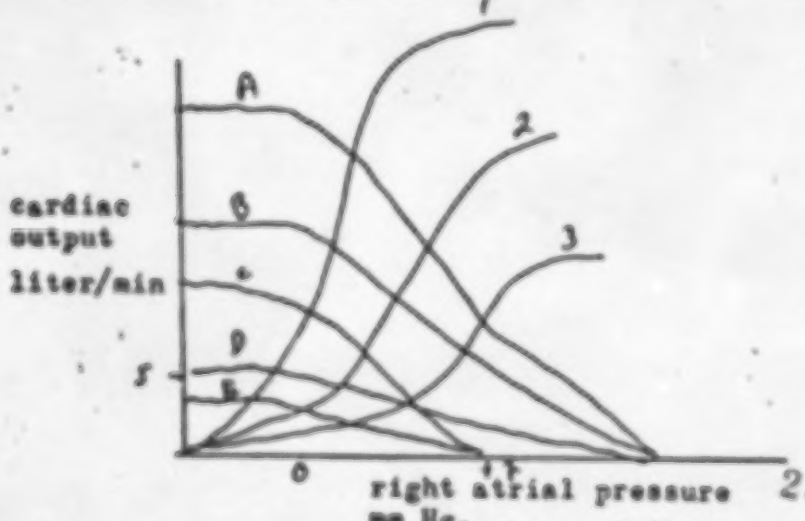
D. dextran _____

Next to each of the three solvents which you did not choose explain why, in your opinion, it is not suitable.

7. After the successful resuscitation, Mr. Davshuni's cardiac output was influenced, on the one hand, by the treatment he received, and, on the other hand, by his weakened heart muscle, due to the myocardial infarction.

The following are curves of cardiac output and right atrial pressure. Cite the two curves (marked in letters and numbers) which show Mr. Davshuni's cardiac output immediately after resuscitation ended. (Assume that the only treatment he received is that known to you from previous questions.)

Mr. Davshuni's cardiac output is described by the point of interception between curve no. _____ and the curve bearing letter_____.



(Curve C and Curve 2 describe the normal situation.

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Questions for Section 4 (Recommended time for entire section: 90 minutes.)

1. Diabetes is a disease of the pancreas. This organ has internal and external secretion. For each of the following sentences mark:

   A: correct for insulin

   B: correct for glucagon

   C: correct for external secretion

   D: wrong

   _____ A. rise in secretion level causes increase in secretion

   _____ B. rise in blood sugar increases secretion

   _____ C. CCK increases secretion

   _____ D. stimulation of the vagus increases secretion

   _____ E. secretin raises the bicarbonate level in secretion

   _____ F. pancreatotropin secreted by the hypophysis increases secretion

   _____ G. decrease in pH to under 4.0 increases secretion in the digestive tract

   _____ H. hunger increases secretion

   _____ I. substance secreted from alpha cells in the Islets of Langerhans

2. If the doctors could check Mr. Davshuni's blood insulin level, they would use a radioimmunoassay. This test has a number of components. The following is a list of the test's components. Which are not part of radioimmunoassay? (Mark the incorrect answer.)

   A. binding of competitive protein to the insulin

   B. use of known quantities of labelled insulin

   C. measurement of activity of enzyme that breaks down insulin after it is labelled

   D. use of antibodies which resist insulin

3. One of the signs of unbalanced diabetes is polyurea (increased amounts of urine). Which of the following factors is responsible, in your opinion, for this phenomenon?

(Mark the correct answer.)

A. decreased reabsorption of water in the proximal tube

B. decreased reabsorption of water in the distal tube

C. decreased reabsorption of glucose in the proximal tube

D. decreased reabsorption of glucose in the distal tube

4. Secretion of glucose in the urine of human beings begins only after the plasma concentration (and hence the glomerular filtrate) passes the renal reabsorption threshold. In a healthy person this threshold is reached when the plasma glucose concentration reaches approximately 180 mg %. From this point up glucose concentration in the urine rises along with the rise in plasma concentration.

Assume: When the concentration of glucose in plasma is between 180-200 mg % the dependence is parabolic, and described by the function:

$$F(x) = \frac{(x-180)^2}{a}$$

and, when the concentration of glucose in plasma is 200 mg % and its secretion in urine in 0.5 gram, the dependence becomes linear.

Write the function of the secretion of glucose in urine as a function of its concentration in the plasma in the range above 200 mg %.

(Hint 1: The function is continuous.

Hint 2: The point (180,0) is a minimum point of the parabola.)

Recommended time: 15 minutes

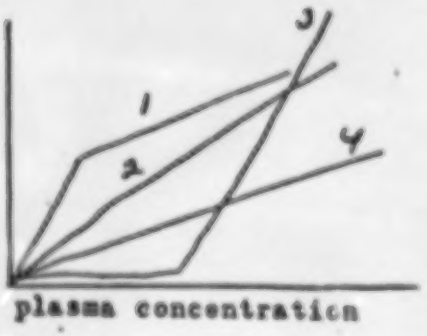
5. The following are graphs which describe the concentration of a substance, secreted in urine, as a function of its plasma concentration.

Which graph best describes the secretion of each of the following substances? Mark the number of the curve next to the substance.

A. inulin. Graph No. _____

B. glucose. Graph No. _____

C. urea. Graph No. _____



6. Glucokinase and hexokinase are two enzymes with the same biological activity. When there is a significant rise in the sugar level of a diabetes patient's blood, the two enzymes do not show an equal rise in activity.

Complete the following table by inserting the names of the enzymes in the proper places.

	Muscle Cells	Liver Cells
Activity is high when there is a significant rise in level of blood sugar.		
Activity is high in presence of normal blood sugar levels.		

7. Two chemical substances were isolated from Mr. Davshuni's urine during the laboratory urine tests: Substance A and Substance E. The following process, described in the sketch below, was used to identify the substances.

1) $A \xrightarrow{OH^{\ominus}} B \xrightarrow{-H_2O} C \xrightarrow{H_2/Pt} CH_3\overset{O}{\overset{\|}{C}}CH_2CH\begin{matrix}CH_3\\CH_3\end{matrix}$

2) $E \xrightarrow{\Delta\,(100^{\circ}C)} A' + CO_2$

3) $E \xrightarrow[H^{\oplus}]{C_2H_5OH} F \xrightarrow[(2)\ (CH_3)_2CHI]{(1)\ EtO^{-}Na^{+}(g)} G \xrightarrow[(2)\ \Delta\,(100^{\circ}C)]{(1)\ H_3O^{\oplus}\ (catalytic\ amount)} CH_3\overset{O}{\overset{\|}{C}}CH_2CH\begin{matrix}CH_3\\CH_3\end{matrix}$

7.1 Identify the substances A and E isolated from the urine. (Hint: A⇌A'.)

_____ _____

Substance A Substance E

7.2 Explain the decarboxylation process: E⟶ A + CO_2.

_____

_____

_____

_____

7.3 Give the chemical names of all the following intermediate substances:

A. _____ D. _____

B. _____ E. _____

C. _____ F. _____

(Recommended time for all parts of question: 20 minutes.)

8. The doctors in the department diagnosed Mr. Davshuni's edema by means of a physical examination. Below are a few statements concerning the clinical examination of edema.

Mark: A: if the statement is correct

B: if the statement is incorrect.

_____ A. In an edematous limb a depression caused by finger pressure on the limb disappears immediately upon release of the pressure.

_____ B. In an edematous limb a depression is caused by finger pressure, but there i no importance as to whether or not it disappears upon relaxation of the pressure.

_____ C. Swelling of the limb changes with postural change of the limb.

_____ D. In limb edema there is a swelling of the veins.

_____ E. Edematous limbs are bluish in color in comparison to normal limbs.

_____ F. A yellow, transparent fluid is secreted through the skin of an edematous limb, and thus the limb is moist.

_____ G. An edematous limb is hotter than a normal one.

_____ H. The findings in a local examination of limb edema caused by cardiac insufficiency are no different from those of edema in pregnancy.

9. Edema is caused by the ratio between hydrostatic and osmotic pressures of the plasma. Complete the following table by marking:

A: when hydrostatic pressure is higher than osmotic pressure

B: when hydrostatic pressure is lower than osmotic pressure

C: when hydrostatic pressure is equal to osmotic pressure.

	Arterial end of capillary	Venous end of capillary
Normal state		
Edema		

10. Blood proteins are the primary cause of the plasma's osmotic pressure. Among them albumin accounts for over 60%.

Given: A capillary 2 mm long with a radius of 10Å containing albumin serum at 37°C. The molecular weight of albumin is 68,500.

Assuming that only albumin is responsible for osmotic pressure, calculate: How much albumin does the capillary contain if the osmotic pressure of the solution in which it is dissolved is 20 mm Hg?

Given: $R = 0.082 \frac{\text{liter-atm}}{\text{mole-deg}} = 1.98 \frac{\text{cal}}{\text{mole-deg}}$

10.1 The amount of albumin in the capillary _____

10.2 Method of calculation: _____

_____

_____

_____

_____

11. The amount of blood flowing through blood vessels in laminar flow is proportionate to the radius of the capillary, and the difference in pressure between the entrance and the exit. Mr. Davshuni's blood vessels were lined in a manner characteristic of hardening of the arteries to the point where their effective radius was halved.

Calculate by how much the pressure must be increased in order for the vessels to transport as much blood as before the hardening process began.

12. Edema can be caused by a number of mechanisms. Below is a list of clinical conditions. In <u>some of them</u> edema might result.

12.1 Mark the four conditions on the list below in which edema might result.

12.2 Next to each of the four conditions which you chose, list (in the allotted space) the mechanism responsible for the appearance of edema.

A. cardiac insufficiency _____

B. infusion of dextran without bleeding _____

C. diet rich in salt for a healthy person _____

D. pregnancy _____

E. extended hunger _____

F. disconnection of nerves ennervating blood vessels _____

Questions for Section 5 (Recommended time for entire section: 20 minutes.)

1. Blood sugar level is generally determined today by a reaction of glucose oxidase. In the past sugar was tested by the Benedict Reaction (reduction of di-valent copper to mono-valent copper accompanied by change in color).

   1.1 Which carbon in the glucose is responsible for the reduction reaction?

   Carbon no. _____

   1.2 Which of the following sugars will not give a positive Benedict Reaction?

   A. fructose

   B. galactose

   C. sucrose

   D. maltose

2. Mr. Davshuni's treatment included a daily injection of insulin. By what mechanism does the hormone act? (Mark the correct answer.)

   Insulin lowers the level of glucose in the blood, and in so doing:

   A. raises the pyruvate and/or lactic acid level in the blood

   B. raises the level of glucose in the cells

   C. increases the secretion of glucose in urine

   D. raises the level of liver glycogen.

3. In a staff conference just before Mr. Davshuni's release, the department's social worker proposed a rehabilitation program for him, in light of his condition and the instructions for his care.

   Design a rehabilitation program for Mr. Davshuni. (If necessary, cite institutes and functionaries. Take all data into consideration. Describe very briefly.)

4. The owner of the grocery store, who did not know medicine at all, promised Mr. Davshuni that there was no sugar in the beer he brought. Mr. Davshuni, who followed doctor's orders strictly, did not accept the grocer's advice, but was not able to explain the grocer's mistake to him.

Assume that the two carbons of the alcohol in the beer were labelled. Name four labelled intermediate substances, associated with sugar metabolism, which will appear in the pathway of alcohol utilization.

(Give the name or the formula.)

A. _____

B. _____

C. _____

D. _____

5. In Mr. Davshuni's place would you have been tempted and drunk the beer? (Mark the correct answer.)

A. Yes - because I am not diabetic.

B. No - because I do not like beer.

C. Yes - because I am thirsty.

D. No - because there's another part to the examination.

APPENDIX V

Policy Guide for the first community

Ambulatory Teaching Clinic

General background

Definition

Governance

Specific objectives

Organizational structure

Budget

Functions and Operation

Manpower

Relations with Soroka Hospital

Reporting system

Teaching

Evaluation

Recommendations for the Planning of a Model Teaching Clinic

1. General Background

The University Center for Health Sciences in the Negev was established in order to achieve certain basic objectives:

i. To unite all the preventive, curative and rehabilitative services presently operating under diversified health delivery agencies.

ii. To raise the standard and quality of health care which on the one hand, would satisfy the community and create confidence in the medical staff, and on the other hand, would bring about a notable increase in the staff's responsibility, satisfaction and scope of activities, serving as a source of attraction to Beersheva medical school graduates as well as to graduates of other medical schools.

iii. To train physicians who view the family and community oriented services as an integral part of care of the sick and health maintenance.

iv. To bring about a reorientation in the Soroka Hospital from a "conventional" hospital institution to a community hospital responsible for all the population's health problems within and without the hospital.

Stemming from the above aims, one of the basic demands must necessarily be the establishment of a number of model clinics, differing from the present organizational framework and enabling the development of the above general principles without which the goals of the Center cannot be achieved. The teaching clinic constitutes the first such experiment. The first step is to establish a teaching clinic in an urban district (Shikun Massada, Beersheva). The second stage will be to establish similar clinic in a rural area (specific location not yet decided upon).

2. Definition

The teaching clinic is a Kupat Holim Clinic which delivers preventive, curative and rehabilitative services. Its director will possess administrative and fiscal independence. The number of staff members will be larger by 30% than the usual clinic, in view of its teaching tasks.

3. Governance

As a natural outcome of its objectives, the teaching clinic will be engaged in services which are presently under the authority of a number of health agencies, the outstanding of which are the Ministry of Health, Kupat Holim and the Ministry of Welfare. It is clear that the clinic cannot be directly responsible to all the various bodies. Consequently, in spite of the clinic's relationship with Kupat Holim, the clinic's director will be directly responsible to the Director of the University Center for Health Sciences (the Dean), who is also Regional Director for Health Services in the Negev. However, the clinic director will coordinate his activities with the various authorities concerned, namely the district offices of Kupat Holim, Ministry of Health, Soroka Hospital, Medical School, each according to its specific area of interest.

4. Specific Objectives of the Teaching Clinic

i. To provide for the health needs of the population; to unite under one medical group and in one place, all the curative, preventive and rehabilitative services.

ii. To fulfill the professional needs of the clinic's medical staff.

iii. To teach physicians and students in the various health fields.

5. Organizational Structure of the Teaching Clinic

i. The clinic will be allotted partial organizational autonomy by delegating administrative authority and fiscal independence to the director of the clinic.

ii. The clinic will deliver a wide range of curative, preventive and rehabilitative health services.

iii. The clinic will maintain close relations and coordinate its activities with the health delivery agencies operating in the Negev, which include Kupat Holim District Office, Ministry of Health District Office, the Soroka Hospital and the Faculty of Health Sciences.

iv. The director of the clinic will have direct approach to the Regional Director for Health Services in the Negev whenever necessary in order to ascertain full cooperation between the institutions.

v. The director of the clinic will act as family physician on a part-time basis, simultaneously bearing important responsibilities and wide authority in all the clinic's fields of activities which will include staff recruitment, staff promotion, teaching and working arrangements.

vi. The relations within the medical staff will be based on mutual responsibility.

6. Budget

i. The regular budget will take into consideration the particular demands and the unique organizational structure of the teaching clinic.

ii. In addition to the regular budget, a special budget will be granted for special programs in teaching, health care and research (basic budget + 30%).

iii. The director of the clinic will be allowed to use his own judgment in applying the regular budget to the population's needs.

iv. Any economies affected by the clinic during the fiscal year through efficient management, will be placed at the clinic's disposal for purposes of improvements, or to be directed to the special budget.

7. Functions and Operation

i. The director of the clinic, together with the clinic's staff will decide upon the operative regulations.

ii. Medical services will operate daily from 7.00 to 20.00.

iii. Precedence will be given to a continuous working day.

iv. Apart from urgent cases, patients will be received on an appointment system.

8. Manpower

i. Personnel will be appointed only after the director of the clinic has given his approval.

ii. At first, each physician will be allocated a lower number of patients than is normally required, in view of the additional burden as a result of the clinic's reorganization. The population load will increase, reaching the accepted norm, within the first two years of operation.

9. Relations with Soroka Hospital

i. The clinic will merge with certain hospital departments in various fields, and will hospitalize its patients in these departments when necessary.

ii. The family doctor will visit his hospitalized patients and participate in their treatment.

10. Reporting System

i. The problem-oriented record system will be employed.

ii. The system will allow for computerization in the future.

11. Professional Supervision

i. In coordination with the relevant department heads, quality standards will be established and regular audit system will be planned.

12. Teaching

i. Will include medical students, interns, family doctors, paramedical staff and the community.

ii. For teaching purposes, the clinic will require space, rooms, equipment and time must be made available for the staff to teach.

13. Evaluation

i. Constant evaluation of the clinic's activities will be undertaken (in comparison with a control clinic and compared with the situation as it was previously). Evaluation will be carried out by the Unit for Evaluation of Health Services. It will cover both process and outcome.

14. Timetable

i. Once the above recommendations are confirmed in principle by Kupat Holim headquarters, negotiations will commence with the various work committees (physicians, nurses, Kupat Holim employees).

ii. Discussions will be initiated with Ministry of Health functionaries in order to clarify the form their cooperation will take in relation to preventive services.

iii. The clinic staff will also initiate discussions with various professional bodies in order to define, in detail, the responsibilities and type of work of the various clinic employees (nurses, social workers, psychologists, etc.)

iv. Proposed time schedule attached.

APPENDIX VI

Example of programming in the Learning Resources Center

General description

Example of objectives

- biology
- clinical studies
- chemistry and physics

Learning Resource Center

An unplanned development of some interest which took place during the first year was the establishment of a Learning Resource Center.

Description.

General

1. **General Objective:** To provide the student with a place for self-learning, with the help of laboratory demonstrations, audio-visual and other teaching aids and with suitable guidance -- but on an entirely voluntary basis.

2. **Location:** The Center will be located in the Medical School laboratory halls (Soroka Hospital O.P.D. Wing), and will contain:

   2.1. A central room (Laboratory "A") for:
   2.1.1. Demonstration of animals, demonstration of selected experiments, and replication of experiments from the biology curriculum

   2.1.2 Exercising clinical skills

   2.2. An audio-visual demonstration room (films, slides, diascopes, tapes)

   2.3. Preparation and storage rooms (materials and instruments)

3. **Timetable:** The Center will be open to students as detailed below, so that every student will have access to it during 8-10 hours per week.

3.1.	Sundays	1600 - 2000	for the whole class	4 hrs
3.2.	Mondays	1400 - 1800	for Group "A" in First Aid for Group "B" in Biology	4 hrs*
3.3.	Tuesdays	1400 - 1800	for Group "B" in First Aid for Group "A" in Biology	4 hrs
3.4.	Thursdays	1400 - 1800	for the whole class	4 hrs

4. **Guidance:** The demonstration Center will be staffed by:

   4.1. An instructor in charge, who will also provide theoretical and laboratory instruction in biology, clinical instruction, will operate audio-visual and other equipment, and will be present during all hours of the Center's operation.

---

*in odd weeks, groups change places

4.2. The staff of the Department of Comparative Medicine, who will hold demonstrations on animals at least twice for each biological system, at times fixed in advance

4.3. Teachers of the biological system studied during the respective periods (at least once a week)

4.4. A senior clinical teacher -- at least once a week

4.5. Physics and chemistry teachers -- at least once in three weeks.

Objectives

1. Biology

1.1. The student will repeat biological experiments, in order to:

1.1.1. try his hand again at an unsuccessful experiment performed in the last formal laboratory session

1.1.2. repeat an experiment performed in the last formal laboratory session, whose results left room for doubt

1.1.3. improve his technical skills in experiments as above

1.1.4. catch up on experiments he missed for reasons beyond his control (army reserve duty, illness).

1.2. The student will design and perform an experiment in biology relevant to the system being studied at the time or the one last studied; he will do this on his own, provided the respective teacher considers the experiment worthwhile.

1.3. The student will manipulate mechanical models or animal-machine-models which simulate biological conditions, in order to clarify for himself obscure points. He will be aided by the instructor in charge, the teacher of the relevant biological system, and by tape-recorded explanations.

1.4. The student will watch demonstrations on animals which will be held at fixed times by the staff of the Department of Comparative Medicine; he will have help from the instructor in charge; the demonstrator, and tape-recorded explanations.

1.4.1. The student will watch preparations for an

operation, the operation itself, and the effects of various interventions performed by the instructor.

1.4.2. The student will perform various interventions -- pharmacological and others.

1.5. The student will watch films and slides dealing with biological material

1.5.1. which has been demonstrated in biology class, but he would like to see again or receive additional explanations on

1.5.2. which he missed seeing in class, for reasons beyond his control

1.5.3. which was not presented in class, for lack of time or other reasons.

1.6. The student will receive explanations on theoretical material in biology which requires elucidation, from the instructor in charge and, if necessary, by the teacher of the respective biological system, during his hours of attendance at the Center.

2. Clinic

2.1. The student will practice clinical skills he was taught in the clinical curriculum, and in which he wants to improve his performance by additional practice:

2.1.1. Skills he was taught in the service stations, e.g. blood pressure measurement

2.1.2. Skills he was taught in the First Aid course, such as: resuscitation, immobilization, applying dressings

2.1.4. Skills he was taught in group discussions, e.g., testing psychomotor development

2.1.5. Skills he was taught in the course on observation e.g., palpation of lumps, listening to heart sounds.

2.2. For the practice of skills as detailed above the student will perform examinations and receive instruction, as follows:

2.2.1. on a fellow-student, under the supervision of the instructor in charge

2.2.2. on teaching aids (e.g. a dummy for the practice of resuscitation, or aids for the palpation of lumps) under the supervision of the instructor

in charge and a senior clinical teacher

2.2.3. through watching films and slides he had missed seeing in the formal program, for reasons beyond his control

2.2.4. through watching films and slides not shown in the formal teaching framework.

3. Chemistry and Physics

3.1. The student will consult on any point requiring elucidation in these subjects, with:

3.1.1. instructors and/or teaching assistants -- one for each subject -- during their hours of attendance at the Center

3.1.2. teachers in these subjects -- during their hours of attendance at the Center.

3.2. The student will watch films, slides and demonstrations not shown in class (to be selected by the teachers).

An example of utilization of the Learning Resources Center is shown in Appendix J.